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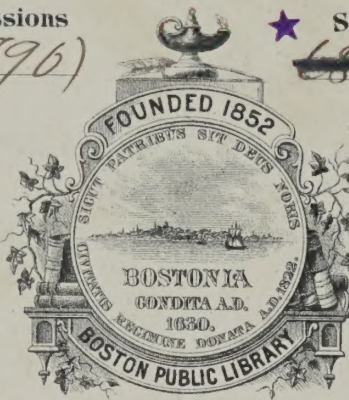
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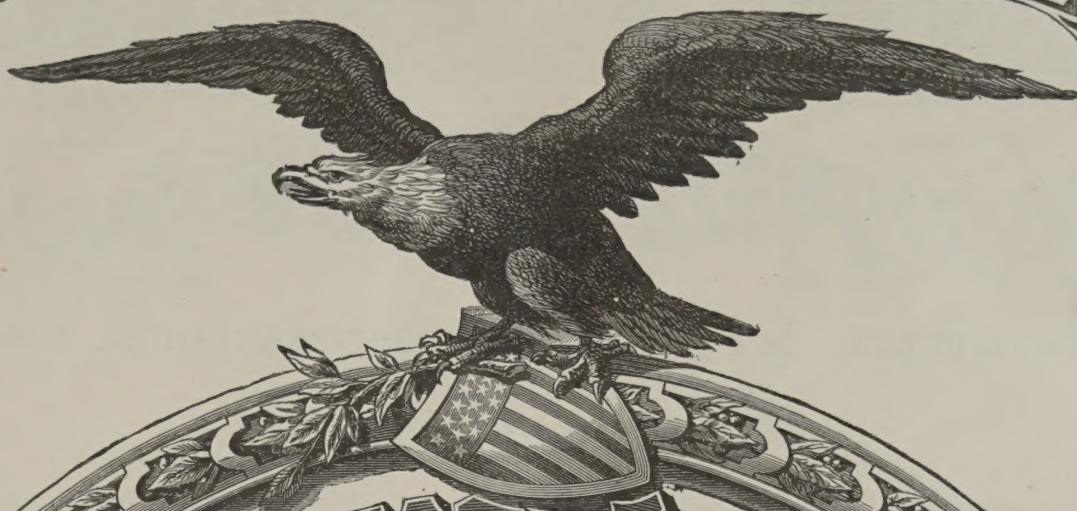
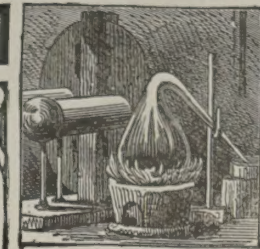
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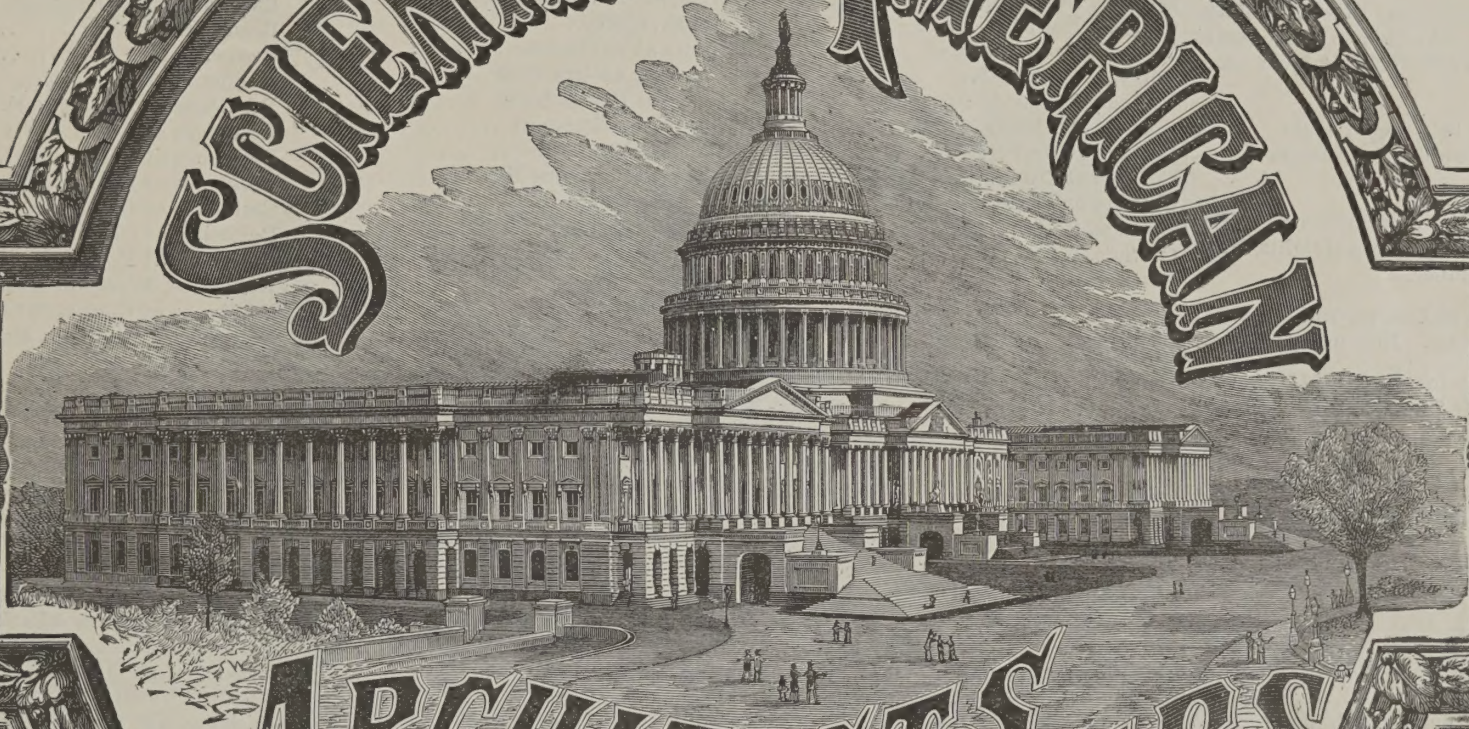
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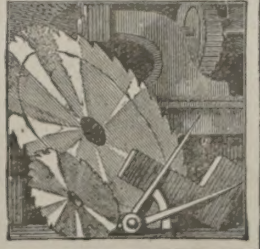


ARCHITECTS
AND
BUILDERS
EDITION.

Vol. XII.

JULY-DECEMBER,
1891.

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July-Dec. '91

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VOLUME XII.-JULY-DECEMBER, 1891.

Articles Marked * are Illustrated.

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- III. A residence on Riverside Park, New York. IV. Houses of moderate cost at Newark, N. J. August number.
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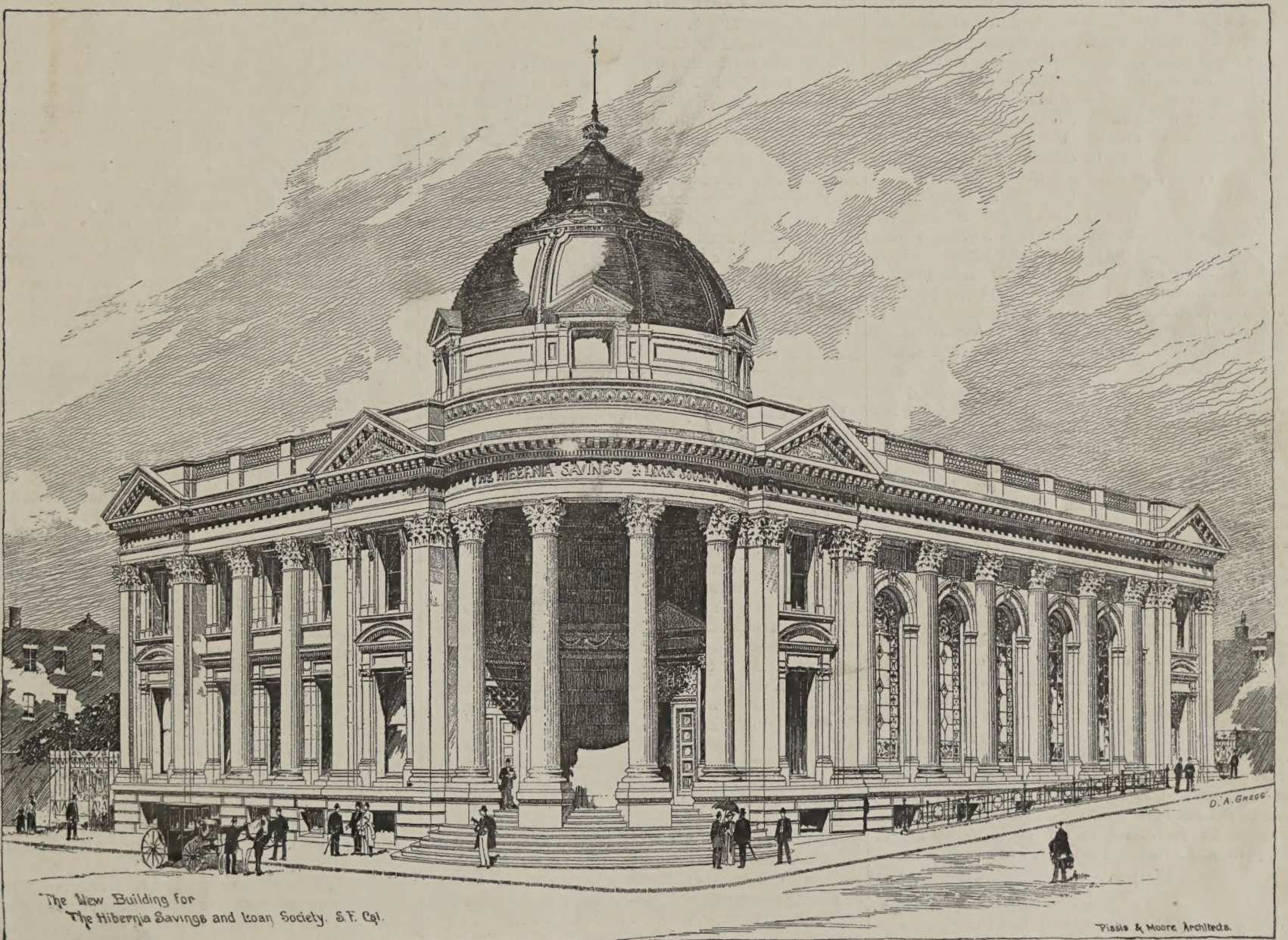
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The New Building for
The Hibernia Savings and Loan Society. S.F. Cal.

Pissis & Moore Architects.

THE NEW BUILDING OF THE HIBERNIA SAVINGS AND LOAN SOCIETY, SAN FRANCISCO.

[See page 2.]

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THE

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\$2.50 a Year. Single Copies, 25 cents.

This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid *Magazine of Architecture*, richly adorned with *elegant plates in colors* and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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THE HIBERNIA BANK BUILDING.

Our plate on page 1 is a view of the new building for the Hibernia Savings and Loan Society, in course of erection on the corner of McAllister and Jones Streets, San Francisco, built of granite; the columns are of granite, solid monoliths and fluted. Messrs. Pissis & Moore, architects. We are indebted for our illustration to *The California Architect and Building News*.

A COLONIAL COTTAGE.

We present herewith a colored plate and floor plans showing a colonial cottage erected for Mr. David McKay, at Brookline, Mass., from plans prepared by the proprietor. The design is admirable, both in arrangement and appearance. Dimensions: Width 30'; depth 41', exclusive of piazza. Height of ceilings: Cellar 7', first story 9', second 8' 6", third 8' 6". Underpinning is built of bluestone, laid rock-faced ashlar. Chimney is topped out with cobbles, laid at random. The exterior framework is sheathed, papered and covered with clapboarding and shingles, painted colonial yellow, with white trimmings. Roof, shingled and painted red. Halls are trimmed with antique oak and provide access to all apartments. One of the novel features of the interior is the arched effect which separates the staircase from hall proper; the columns of oak extending to ceiling, the space between being filled in with spindle work. The staircase window is glazed with stained glass. Parlor is trimmed with sycamore, finished natural; it is provided with an open fireplace, furnished with a tiled hearth, hard wood mantel, etc. Dining room is trimmed with antique oak; it is of good size, is well lighted, and contains a pleasant nook. Kitchen and pantries are trimmed and wainscoted with North Carolina pine, finished natural with hard oil. These apartments are furnished complete. There are three bed rooms, den and bath room on second floor, all trimmed with whitewood finished natural and provided with large closets. Bath room is wainscoted and fitted up replete. Third floor contains four bed rooms, finished similar to the ones already described. Cemented cellar contains laundry, furnace and other apartments. The house is provided with gas, electric bells, etc. Cost \$4,500 complete.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

PHILADELPHIA HOUSES OF MODERATE COST.

One of our colored plates this month shows a row of dwellings, with ornamental fronts, erected for Mr. W. S. Kimball, at Philadelphia, Pa.

Dimensions: The extreme width of each house, between walls, is 18 ft. and the depth 62 ft., exclusive of the 9 ft. piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The design is excellent, and it combines both elegance and convenience. The exterior walls are built of Philadelphia pressed brick, with trimmings of dark red sandstone. Roof covered with Bangor slates. Halls are trimmed with ash, and each is provided with an ornamental staircase, turned out of similar wood. Parlors and dining rooms are trimmed with cherry, and are connected by double sliding doors. Fireplaces, where shown, have tiled hearths and hard wood mantels, provided with beveled plate mirrors, etc. Kitchens, laundries, and pantries are trimmed and wainscoted with Southern pine, finished natural with hard oil. These apartments are fitted up in the best possible manner. Second floor contains three bed rooms and bath room, all trimmed with ash, and the latter wainscoted and provided with tub, bowl, and closet complete. Third floor contains three bed rooms and storage. Cemented cellar contains furnace. The cost of corner house was \$7,500 and the inner houses \$5,800 each. Messrs. G. U. & U. D. Hewitt, architects, same place.

Our engraving was made direct from a photograph of the buildings taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT LONGWOOD, NEAR BOSTON, MASS.

We present, on page 4, an engraving showing a country residence erected for Mrs. M. Shailer, at Longwood, Boston, Mass. The design is excellent; it combines both a very attractive exterior with piazza and plans showing numerous large rooms conveniently located, fitted up first class, and provided with furnace, range, gas, electric bells, and all the improvements. Dimensions: Front, 47 ft. 6 in.; side, 48 ft., exclusive of front piazza. Height of ceilings: Cellar, 7 ft., first story 10 ft., second 9 ft., third 9 ft. Underpinning of rock-faced stone. First story clapboarded and painted light olive green, with bottle green trimmings; second and third stories shingled and painted yellow. Roof shingled and painted red. Cemented cellar under whole of house contains laundry, furnace and other apartments. Vestibule has a tiled floor. Hall trimmed with cherry. Ornamental staircase, with carved newels, and lighted by stained glass windows. Parlor is finished in ivory white and gilt and is provided with an open fireplace, furnished with white enameled tiles,

and a mantel finished same as trim. Library, trimmed with mahogany, is furnished with a pleasant nook, bay window and fireplace. Dining room trimmed with oak contains a fireplace and buffet built in. The rear hall and stairs are conveniently located, and form access to kitchen from front hall. Kitchen and pantries are trimmed and wainscoted with hard Southern pine, finished natural with hard oil. These apartments are replete in all their appointments. Second floor contains four good sized bed rooms, large closets, den, and bath room, the latter wainscoted and provided with the usual fixtures in the best possible manner. There are three bed rooms and storage on third floor. Cost, \$8,700, complete. Brigham & Spofford, architects, Boston, Mass.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT GERMANTOWN, PA.

Our engraving on page 5 presents a stone residence erected for Mr. George W. Bell at Germantown, Pa. Dimensions: Front, 42' 6"; side, 38' 6", exclusive of piazza and porch. Height of ceilings: Cellar, 8'; first story, 9' 6"; second, 9'; third, 8' 6". The design has a very picturesque exterior, large well shaded piazza at front and rear. Exterior walls throughout are built of rock-faced Chestnut Hill stone. Roof covered with Bangor slates. The plan is excellent; every room opens on to hall. Kitchen and its apartments are located in cellar; these apartments are trimmed and wainscoted with hard southern pine, finished natural. Cellar also contains laundry, furnace and other necessary apartments, fitted up replete. Reception hall is trimmed with antique oak; it contains an ornamental staircase with carved newels. Parlor is finished in white (china gloss) and gilt; the fireplace is furnished with a tiled hearth and a mantel of exquisite design. Library is trimmed with cherry, and dining room with oak; both have fireplaces with tiled hearths and hard wood mantels. Butler's pantry is fitted up with the usual fixtures and also provided with a dumbwaiter to kitchen. Back stairs are private from cellar to third floor. There are four bed rooms, large closets, and bath room on second floor. Bath room is wainscoted and fitted up in a first-class manner. Five bed rooms on third floor. These bed rooms are trimmed with white pine, finished natural. Cost \$10,245 complete.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT CHESTNUT HILL.

Our engraving on page 7 presents a perspective, showing "Highfield," the country residence erected for Walter E. Rex, Esq., at Chestnut Hill, Pa., from plans prepared by Mr. Thomas Lonsdale, architect, Philadelphia, Pa. Dimensions: Front, 65 ft.; side, 44 ft. 6 in., not including piazza and porch. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The exterior walls are built of rock-faced Chestnut Hill stone. Above this the building is made impressive by the chimney and parapet wall, also the steep pitched roof, covered with Bangor slates. According to the plans, the exterior has an abundance of piazza room and porte cochere, and the interior a large hall opening into the various apartments, which are well lighted and fitted up in an elegant manner. Hall, trimmed with antique oak, is finished in old English style. The ceiling is heavily beamed and ribbed, forming deep panels. Both halls have a paneled wainscoting. Fireplace, built of brick, has a hearth laid with same, and mantel with mirror, etc. After one short run, the staircase turns to the left, forming a balcony, the posts of which have carved caps. At the top of these stairs are two bay windows (with seats) thrown out at either side of chimney breast. These windows are glazed with stained glass, shedding a pleasant light over upper and lower halls. Floors throughout are of hard wood. Parlor and library are trimmed with mahogany, dining room with oak, and breakfast room with ash. Fireplaces are handsomely fitted up with tiled hearths and hard wood mantels, of exquisite design. Kitchen, laundry, and pantries are trimmed and wainscoted with North Carolina pine. Second floor contains four bed rooms and bath room, all trimmed with chestnut, finished natural. Bath room is wainscoted and fitted up replete. Three bed rooms and billiard room on third floor. Cemented cellar contains furnace and other apartments. Cost, \$14,000 complete.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

COTTAGE NEAR BOSTON, MASS.

Our engraving on page 8 illustrates a very attractive and convenient cottage, of colonial style, erected for Mr. Chas. Eager, at Longwood, Mass. Dimensions: Front, 28' 6"; side, 38', not including front porch. Height of ceilings: Cellar, 7'; first story, 9'; second, 8' 6"; third, 8' 6". Underpinning is built of Chestnut Hill stone, laid rock-faced ashlar. First story is clapboarded and painted colonial yellow with ivory white

trimmings; second story shingled, stained sienna. Roof shingled and painted red. Cemented cellar contains laundry, furnace, and other apartments. The plan is excellent and the hall provides access to all the apartments. Hall is trimmed with antique oak, and is provided with a unique staircase, separated from hall proper by ornamental columns that rise to ceiling. Between these columns are gothic arches, the space at one side being filled in with spindle work. This staircase is lighted by stained glass windows, that shed a soft and pleasant light over upper and lower halls. The floors are of hard wood laid in narrow widths. Parlor, trimmed with sycamore, contains a fireplace, fitted up with a tiled hearth and oak mantel. Dining room, trimmed with cherry, is furnished with a pleasant nook with seats, spindled transoms, etc. Butler's pantry is of sufficient size to admit all the necessary fixtures, etc. Kitchen is trimmed and wainscoted with yellow pine, finished natural with hard oil; it contains all the improvements. There are three good sized bed rooms, large closets, den and bath room on second floor, and three bed rooms and store room on third floor. These apartments are trimmed with whitewood and stained and painted as directed. Bath room is wainscoted, and contains tub, bowl and closet complete. This house is also furnished with gas, electric bells, range, furnace, electric lighting, etc. Cost \$4,500 complete; this house could be erected for much less by substituting white pine or whitewood instead of the hard wood. Messrs. Rand & Taylor, of Boston, were the architects.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A RESIDENCE IN MINNEAPOLIS.

Herewith we give a perspective view of the new and substantial stone residence of E. A. Merrill, Esq., Minneapolis, Minn., W. Channing Whitney architect. Our plate is from the *Northwestern Architect*.

DWELLINGS AT SYRACUSE, N. Y.

The dwellings shown on page 9, erected by E. E. Price, of Syracuse, are very different from the ordinary way in which houses to rent are constructed. They consist of nine double houses, placed in three rows of three double houses each. Each house is designed for one family which will occupy first floor, second floor, and have a large garret for storing articles and drying clothes. The cellar for each is 10 ft. deep. All are built on an Onondaga limestone wall 20 in. thick, with a brick division wall running from front to rear, making each cellar distinct from the other. The style is "Queen Anne," with a front porch, and rear piazza, that runs the whole width of the house, making two fronts and no rear. The chimneys are built of National pressed brick above the roof. The plumbing is first class, being done by days' work. Nine houses are alike, having a large hall, parlor, dining room, kitchen, and pantry down stairs. Up stairs: large hall, four bed rooms, with large closet for each, also a good sized bath room. There is a closet in cellar, the floor grouted, and all well drained. The roofs are shingled, the windows extra large, single lighted, and best quality glass. There is a stationary range in each house, hot and cold water, gas in each room and in cellar. The gas fixtures are from the house of Oxley, Giddings & Enos, Canal St., New York. Electric call bells for front and back doors.

The place where the houses are built used to be 13 ft. below the sidewalk. So Mr. Price laid the foundations for the walls at that depth, built the walls to the required height, which was about 15 ft., and then filled in around the walls to the level of the sidewalk. The ground covered by the houses is 180 ft. front by 260 ft. deep, with an annex which will be used for a park, which is 170 ft. front and 260 ft. deep, and will be fitted up with croquet and lawn tennis grounds, flower beds, and summer house. The rooms

are all lighted by gas, and every room heated by steam from a plant located at the rear of the premises; water is also furnished from a well almost 100 feet deep; under pressure of 30 lb the water is forced through a filter before it enters the house pipes.

In every parlor there are fireplaces, cherry mantels, and French beveled glass; the staircases are paneled, turned, and solid cherry; parors and halls all finished in cherry; a large cistern in each cellar, also a copper tank in the garret, force pump in kitchen, hot and cold water, also range furnished with each kitchen; electric bells, stationary wash tubs, sinks, and pantry; the cellars have grouted bottoms, the drainage is perfect, plumbing first-class, being all done by the day. The houses were built by Mr. Price, he getting out all the work at his own factory; have been one year building, employed between 75 and 80 workmen; used 3 car loads of shingles, over 100 car loads of lumber, between 3 and 4 tons of nails, about 415 cords of stone in the foundations, about 150,000 bricks used in division walls and chimneys, about 13,000 yards of plastering (adamant), used almost two miles of steam and water pipe. A 50 horse power boiler is used to run the pumps and machinery. The whole cost was \$75,000.



A RESIDENCE AT MINNEAPOLIS, MINN.

Rents from \$25 to \$35 a month; will accommodate eighteen families.

The lawns are cut, sidewalks and porches swept, and all outside work is done by a janitor, who removes the ashes and garbage from each house every morning, depositing it in a place built expressly for that purpose, where it is kept until garbage day, when it is placed on the platform within reach of the wagons.

Our plate was made direct from a photograph specially taken for the SCIENTIFIC AMERICAN.

A COACH HOUSE AND STABLE.

Our engraving, page 11, illustrates a coach house and stable erected for Mr. Walter Rex, at Chestnut Hill, Pa., from plans prepared by Mr. Thomas P. Lonsdale, of Philadelphia, Pa. The perspective, which is made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN, shows a very attractive and tasty exterior, while the plan presents a roomy and convenient interior. The size of the main structure is 23x42 ft., exclusive of pit and covered way. First story is built of Chestnut Hill stone, laid up at random. Gables are shingled and left to weather finish.

Roof shingled. Coach room, 20x25, good size, is fitted up with carriage wash, harness closet with glass doors, and stairs that lead to man's bedroom and storage loft on second floor. Stable, 14x20 ft., is provided with two single stalls and a box stall, fitted up with the usual fixtures and ornamental iron furnishings. The walls and ceilings throughout the interior are ceiled with yellow pine, finished natural, with hard oil. Cost \$1,000, complete.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

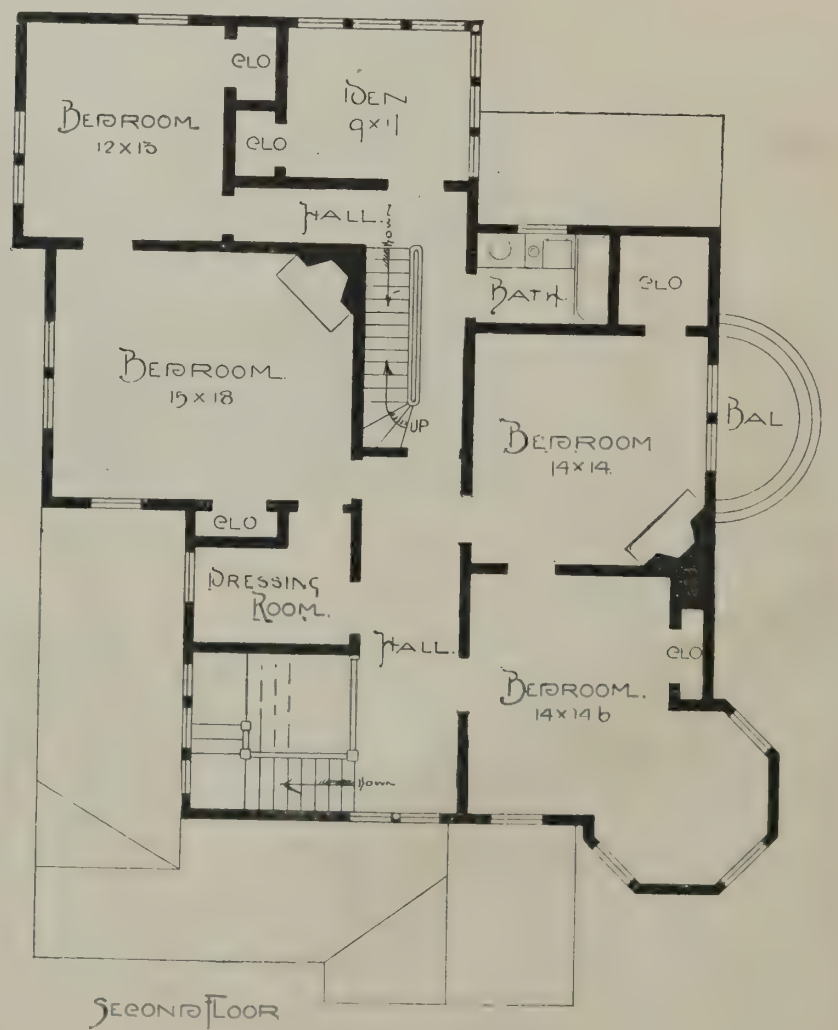
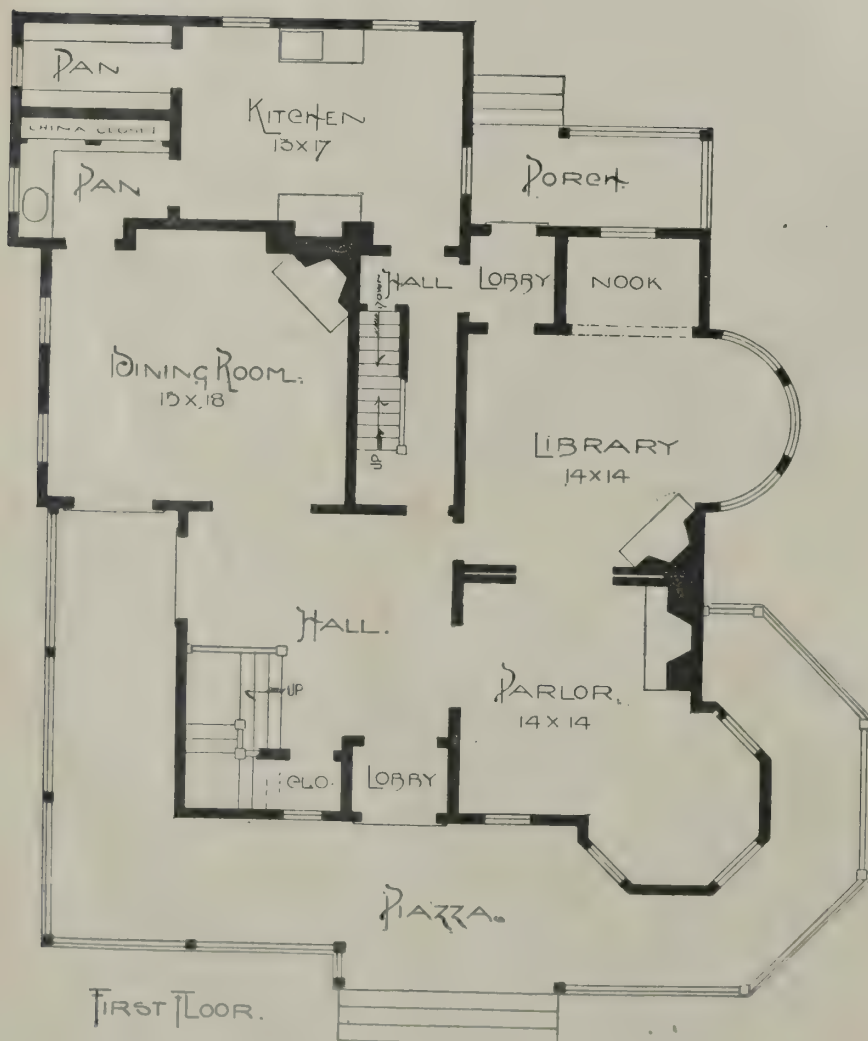
A COTTAGE AT BROOKLINE, MASS.

We publish on page 12 a suburban cottage, erected for Mr. J. C. Church, at Brookline, Mass. The design presents a tasty bit of colonial architecture, with an ornamental chimney at side, a spacious piazza across front and a roomy and comfortable interior. Dimensions: Front, 30 ft.; side, 38 ft. 6 in., exclusive of piazza or porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Underpinning is built of blue stone, laid rock-faced ashlar. First story is covered with clapboarding, painted yellow with white trimmings; second and third stories are shingled and stained sienna. Roof shingled and stained "moss" green. Hall, spacious, is trimmed with antique oak and provided with a Dutch door at entrance, with upper half glazed with stained glass and a staircase of unique design. Floors throughout are of oak, laid in narrow widths and highly polished. Parlor is trimmed with cherry and dining room with oak; both have open fireplaces, furnished with tiled hearths and hardwood mantels, with beveled plate mirrors. Dining room has a paneled wainscoting. Kitchens and pantries are trimmed and wainscoted with ash and fitted up replete. Second floor contains four spacious bed rooms, with large closets and bath room; these apartments are trimmed with various kinds of hard wood, and the latter is finished natural. Bath room is wainscoted and provided with the usual fixtures in the best manner. Three bed rooms and storage on third floor. Cemented cellar contains laundry, furnace and other necessary conveniences. This house is provided with range, furnace electric bells, electric lighting, speaking tubes, gas, etc. Ceilings are corniced. Cost \$3,600 complete. This house can be built for much less by trimming the interior with soft wood. Messrs. Rand & Taylor, of Boston, Mass., architects. Our engraving was made direct from a photograph taken specially for the SCIENTIFIC AMERICAN.

The general public has but little idea of the immense amount of work that must go

into the drawings for a large building of the first class. One of the best known of Western architects rather surprised a newspaper man the other day by exhibiting to him the drawings for the steel construction of a fireproof building and showing him how every piece of steel, even to the arrangement of the rivets, their exact size and weight, had to be accounted for, and by telling him that this work for one large building in Chicago would equal one man's time for five years. It is strange that the work of the architectural profession, which is of interest to every one who sleeps with a roof over his head, should be so little understood by the public at large, but it is doubtless a fact that nine persons out of ten look upon an architect as a picture maker whose only aim is to obtain a telling effect on paper, leaving everything else to the builder. The profession has a large work before it in educating the public up to a proper appreciation of its services and a knowledge of its duties.—N. W. Architect.

For a good gold or gilt lacquer for polished brass work, use lacquer made of shellac and alcohol colored with dragon's blood or turmeric to suit your taste.



[See page 2.]

A RESIDENCE AT LONGWOOD.



[See page 2.]

A RESIDENCE AT GERMANTOWN, PA.

A TWO STORY SUMMER RESIDENCE.

Herewith we give from the *London Builder* a design for a two story house, R. A. Briggs architect. There are various desirable features in this design, which commends itself by its simplicity and excellence of proportion.

Decorative Treatments and Materials.*

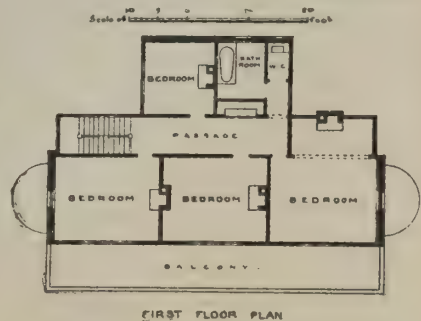
BY GEORGE HOWE.

I have recently seen and used a preparation of gypsum, so finely milled that a large number of coats do not exceed the thickness of the thirty-second part of an inch. The best gypsum is nearly as hard as the calcareous stones and after its water of crystallization has been drawn off, it becomes pulverulent, and like flour. If fresh water be presented to it, it recrystallizes and reassumes its original density and strength. Some color can be milled with it, and when thus prepared by a special mill, which has been lately introduced into this country, there is provided for us an available material which, simply mixed with water, forms not only a good substitute for distemper as now known, but which, if persevered with, will positively drive out of use whitening and size. Of course only pale tones can be had, because as much gypsum as possible must

distempers," composed of compounds of oil and water in the original manufacture, which are, of course, mechanical mixtures. I only refer to them as inexpensive mediums for the plain treatment under discussion.

Until recently, gypsum has only been prepared and used for relief ornament when gauged with water and cast in rigid moulds as plaster of Paris; it sets so quickly as to be unworkable otherwise than in moulds. The inconvenience of fixing has prevented its use other than for a new building or making extensive alterations, where there is ample time for execution. It hardly ever occurs to any one to use plaster of Paris cast and moulded bass-relief decoration, in the limited time at their disposal, when probably only a few weeks can be given, and another thing operating against it is the time that must elapse before it can be treated with color. A few months ago I found that the preparation of gypsum already named could also be used in various thicknesses up to about $\frac{3}{8}$ in., and that it is possible to color finish forthwith without any injury to the color. Another great advantage is, that the several coats of paint required by every other bass-relief material in use are not needed, because of the color being incorporated with the gypsum. The underpainting tone is amply secured by a thin coating of a

green—ocher color underpainted with glaze of terra verte; (2) Old ivory white—pure white underpaint, glaze with raw sienna; (3) Terra cotta—red ocher underpaint, glaze of burnt sienna. Depth or paleness of tone is secured by more or less color in admixture with the glaze medium, and brilliancy or dullness is more or less due to the judicious intermixture of the pigments. The tonings possible by the slight washes of flattening varnish are such that their beauty can only be fully realized when placed in juxtaposition with the usual colors and method of mixing for house painting. I do not wish to insist that all interior painting shall be done wholly by thin glazes, without any other mixture, for it is necessary often where the number of coats is limited, and for bedrooms in particular, that paints be mixed with white, or, in other words, the "stainings" must be incorporated with either white lead, zinc white, or Charlton white; as the two latter are not so dense, I prefer them, for the first coat should assert itself through the last. When painting work is described as "two oils and one flat," the first and second coats should be of a brighter hue of the same color as the last or flattening coat, which if stippled will have a degree of luminosity that will amply repay the trouble of



A TWO STORY SUMMER RESIDENCE.

be retained. Gypsum, so prepared, does not easily wash off, and is such a fine powder that it is absolutely impalpable. Every time of redoing the surface only needs to be sponged, and each coat forms practically a layer of plaster of Paris, or almost a Keene's cement surface, of course not so washable as a troweled surface, yet comparatively washable. We cannot, as far as our lights now are, have a better base for a material as a color wash for ceilings and walls, where distemper has been usually applied. This preparation of gypsum, which may be called a liquid Keene's or Parian cement, will eventually supersede the crude absorbent preparation of whitening bound with size. One of its great features is the simplicity with which it is handled, and also its cheapness, from the fact that the supply of the raw material is practically inexhaustible and readily quarried.

When a deep rich tone is required for a plain monotone wall surface, there is open to you a variety of methods of treatment at comparatively small cost. For instance, take the prepared colored gypsum already named, give this one coat of an oil mixture, toned with the pigments I shall later on refer to; there are then at our command tones of color of any depth, soft and pleasing, and what is more, an improved washable method with a perfectly dull or flat surface, duller than flatted paint. Then, again, there are various mixtures of what are known as "washable

colorless solution prepared for this purpose, easily applied, inexpensive, and which in no degree destroys the sharpness of the ornament. The prepared gypsum is applied in impalpable powder, is made into a paste by the manipulator by the addition of water alone, and can be laid on thick or thin as may be desired. Various rough granulated surfaces can be obtained by the use of stipples or bristles, carpet, wood or metal; broken nondescript surfaces modeled into some form with the ordinary painter's brushes, giving flower-like shapes. If transparent glazes are effective on plain surfaces, they will be doubly so on moulded and low-relief surfaces, as the concave will be deeper than the convex, and the quirk deeper than the arris. I will give a few underpainting and glaze arrangements: (a) This tone of primrose yellow is obtained by an underpaint of pure white, and on it a glaze of Indian yellow; (b) This soft turquoise tone, by an underpaint of pure white, and a glaze of Antwerp blue with a dash of ultramarine; (c) This moss green tone by an underpaint of primrose and a glaze of Antwerp blue dashed over with a thin coat of terra verte; (d) This one, a rich rose—a red yellow underpaint glazed with permanent madder lake; (e) old oak brown—a brown-yellow underpaint with a glaze of Vandyke brown; (f) A rich deep old gold tone—the underpainting is of a maize yellow, glazed with a yellow lake on which is laid a coat of flattening varnish, tinted with burnt sienna; (g) A peacock blue—underpainting a pale ocher color, glazed with Antwerp; (h) Olive

selection early in the work, although not of that subtle charm, crispness and rarity.

THE vastness of Maine's timber wealth is not generally appreciated. Every year now 500,000,000 feet of logs are cut in the State, about one-third of this amount floating down the Penobscot; and the quantity of manufactured lumber that has been shipped from the State since the first saw mill was started is enormous beyond description. To-day the Penobscot log crop is sawed almost wholly for the American market, New York, New England ports, and Philadelphia taking the bulk of it. An occasional cargo of "shippers," as a certain quality of pine boards are called, is sent to the Windward West India Islands, but all the other long timber is sold in home markets. Improved machinery enables the manufacturers to get more and different dimensions of lumber out of a log than formerly, and in recent years a great variety of short lumber has appeared in the market.—*Southern Lumberman*.

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* Abstract from a paper lately read before the Society of Architects, London.



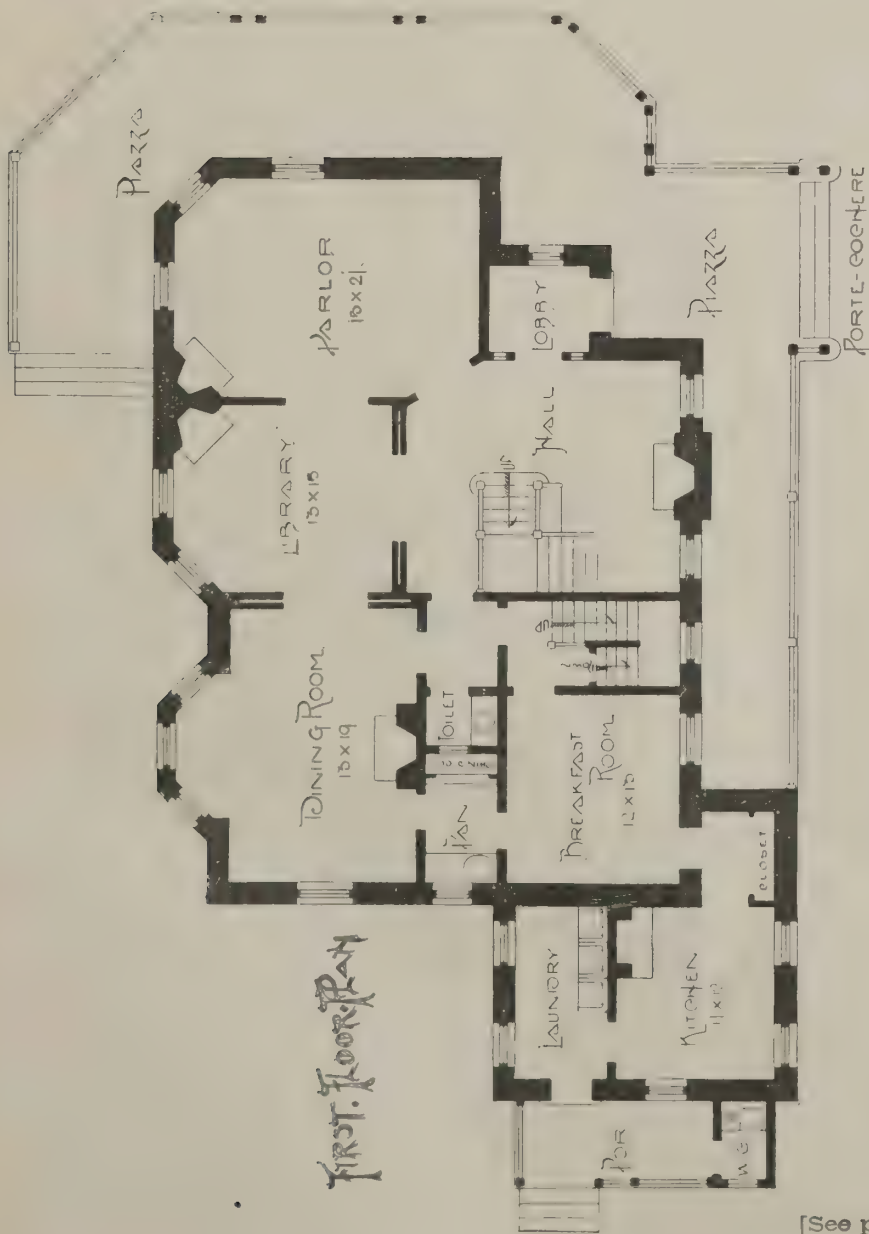
A COLONIAL COTTAGE.



FIRST FLOOR.

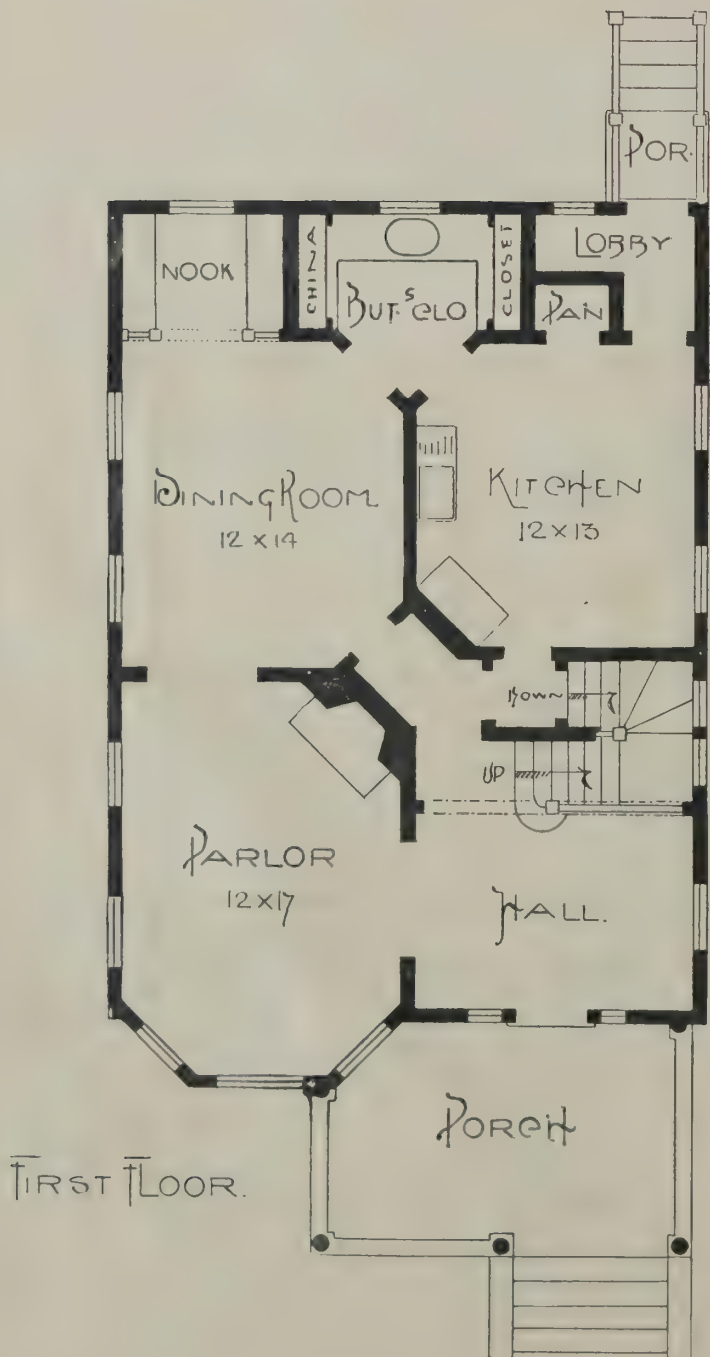


SECOND FLOOR.



[See page 2.]

A RESIDENCE AT CHESTNUT HILL.

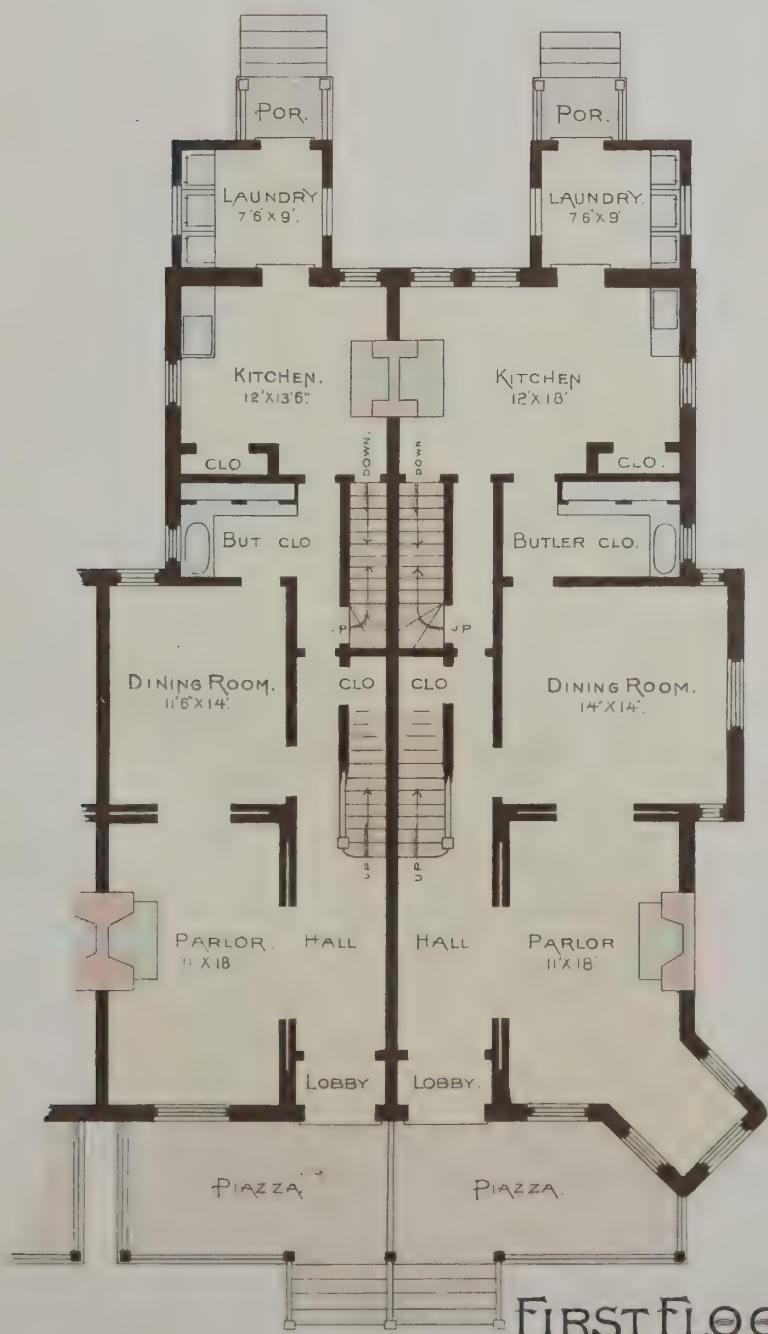


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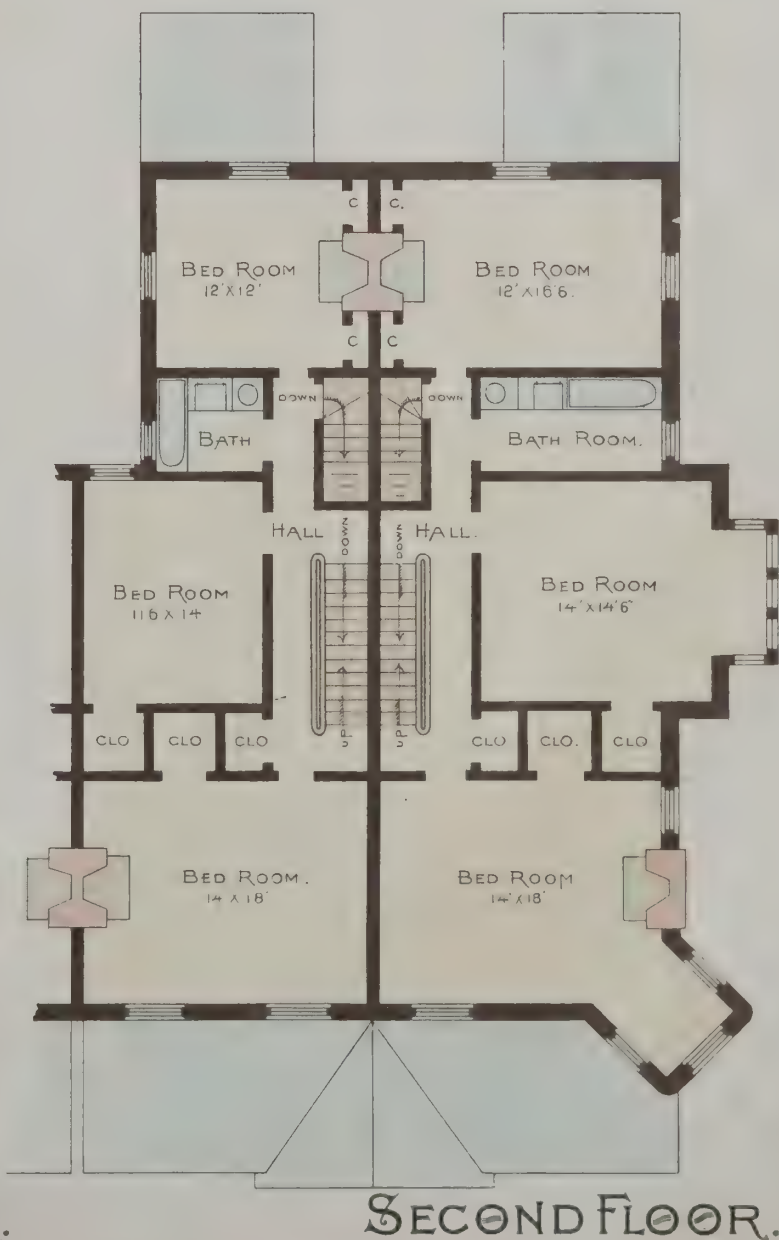
A COTTAGE NEAR BOSTON, MASS.



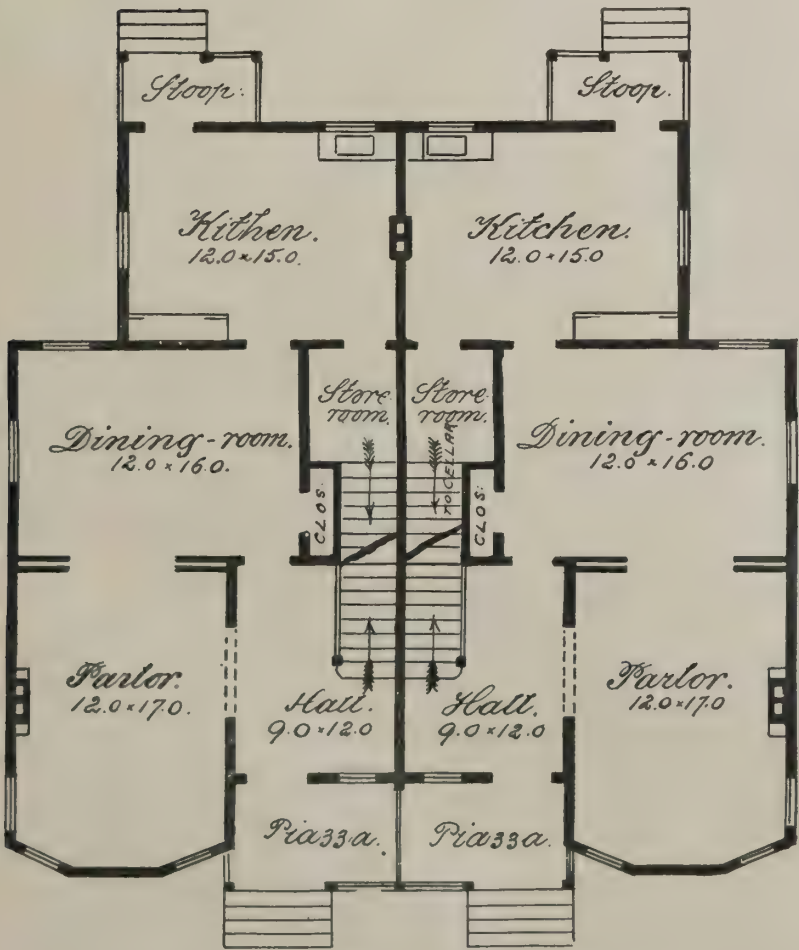
PHILADELPHIA HOUSES OF MODERATE COST.



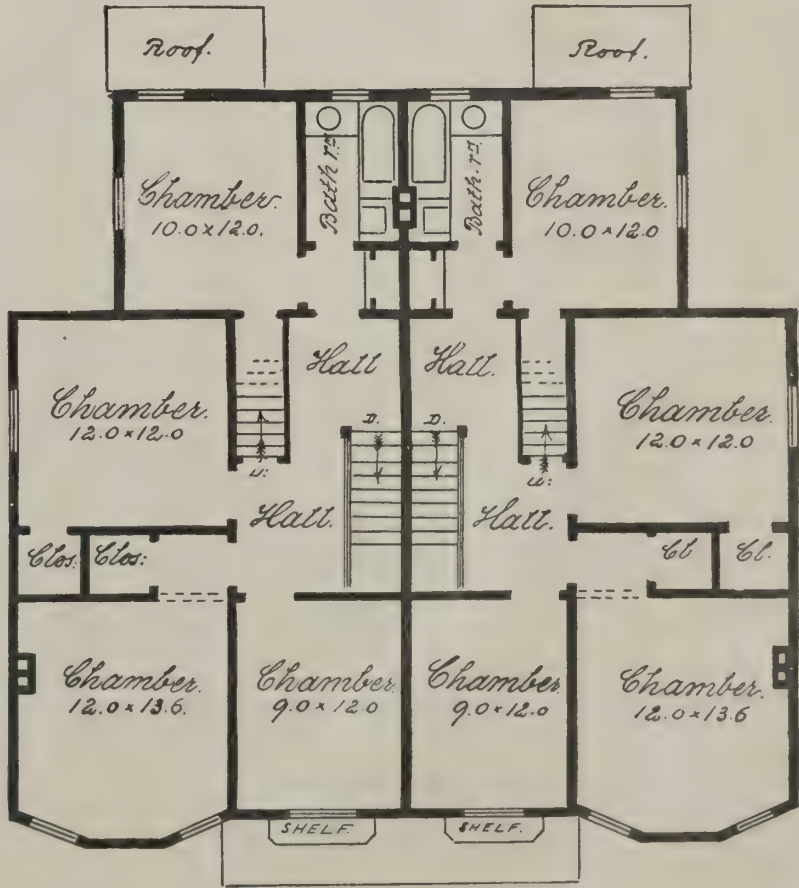
FIRST FLOOR.



SECOND FLOOR.



First Story Floor Plan.



Second Story Floor Plan.

[See page 3.]

A GARDENER'S LODGE.

The picturesque little dwelling shown below of colored pine, was built at X by O. André, of Neuilly, on private property. It is a gardener's lodge of modest pretensions, the projecting roof of which affords shelter to pedestrians from rain or from the burning rays of the sun. Its general appearance reminds one of Alsatian dwellings.

In its erection pains were taken to use only wood cut by machinery.

The little projection added to the roof in the rear is utilized for the storage of utensils, etc. Under the front roof is a shelf for bee hives.

Wall Paper.

Although wall paper has become an essential feature of interior decorations and is found in almost every house in the country, it would seem from general observation, says the *American Stationer*, that nothing which enters into our home life is selected with less thoughtful attention. The pattern is often chosen from a sample, with no reference whatever to the furniture, the carpets, the size or shape of a room, and it too often happens that after great outlay and no little trouble and inconvenience the effect is totally at variance with preconceived ideas of the effect. The fault, quite likely, is less in the paper than in the individual who selected it.

Of course there is a great deal of ignorance regarding decorations; few people understand the underlying principles, and, strange as it may seem, fewer still have grasped the first laws of color effect, of contrast and of harmonious scheme.

In no single feature of the decoration of a room is there more need of discriminating judgment and cultivation, for the very obvious reason that there is a character of permanency in the wall hangings which does not inhere in any other class of furnishings. If they are out of taste and harmony, it must be endured for a period of time, at least, while the movable articles can be changed about, grouped or replaced if they are not wholly satisfactory. Indeed, it is not difficult to believe that a poor and homely wall paper might seriously affect a nervously organized system sensitive to, although possibly ignorant of, the influence of color and forms, so that the story of the farmer's wife who committed suicide because she was so tired of looking at the ugly paper on the walls is not altogether improbable.

Paper hanging may not be an exact science, but it

is something of an art. To be able by the use of paper to make a low-ceilinged room look higher and a too lofty one lower; to give a cozy aspect to an oversized room and enlarge the apparent area of a little one certainly requires a knowledge of cause and effect and taste and skill in making such knowledge obedient which are things the average man and woman do not possess.

Then, too, the effect of stability should not be wanting and the function of background for furniture and pictures should not be ignored. In the architecture of antiquity proportion played a conspicuous part in the arrangement of walls, in which there was a sort of upward striving which expressed itself in the heavy, solid-looking dado, the lighter middle wall, and the bright, airy, unconstrained frieze, thus conveying in the dado the idea of the strength and solidity needed to support the wall, a lighter decorative scheme for the middle portion, which suffers less strain, and a purely decorative frieze which requires little or no strength for the work it has to perform.

In observing these and many more details, and in carrying them out successfully, requires special acquirements and experience. The exercise of taste—its possession being a first necessity, of course—and familiarity with the laws of proportion and harmony are essential, so that on the whole it would seem best, in all situations requiring such technical skill, to employ a professional decorator, and trust to his taste to produce a scheme of wall covering which will bring all of the contents of the room into sympathetic and harmonious relation with it and to each other.

Many of the new styles of wall paper brought out within the year are singularly rich and effective. Some flat papers are marvels of tasteful and effective designing. While these are classed among the cheaper goods, they are in many other respects equal to any other

made, especially where luster tints are used, which give a depth of tone to the coloring not seen in ordinary flat papers.

There are also extremely elegant papers known as "crystalline" and "opalescent," in which the effect is produced by mixing mica with the pulp. Pulverized mica is also mixed with the colors in the process of printing, by which brilliant results are secured. There are many charming designs produced in mica paper, the grounds generally being of a pale, soft tone, which throws up the flowers in the design clearly and sharply. On a pale sage green there are thrown irregular branches of cherry blossoms, and laurel blossoms in white mica shining upon a warm gray ground is another most charming design. Often the flowers have an iridescent glow, as though sparkling with dew under the beams of a morning sun. As may be supposed, the effect is quite wonderful.

Satin papers show trailing vines of arbutus, morning glories and trumpet flowers in deliciously soft tints. Cornflowers, bluebells and graceful grasses, falling in showers or gathered in loose clusters here and there on an ivory ground, are indescribably pretty. Then there are brocaded patterns showing details in soft, pleasing colors outlined with gold, and sometimes the stencil is used with fine effect with blended colors on a pale or creamy ground. A pattern of aster blossoms rendered in this way is very handsome. The borders for these papers are often very striking, the grounds being of bright colors at the base and shading away to a light neutral tint at the top, overlaid with garlands of flowers or upright, reedy growths mingled with bright-hued blossoms.

"Damasks" form another line of beautiful papers in

of value to the designer of the humblest cottage. He says of the hall:

You remember when it was dark as Africa, four feet wide, with narrow stairs straight down to the door, leaving only space enough for a sewer pipe umbrella stand decorated with decalco—how do you spell that?—and a black walnut hat rack squeezed into the side, upon whose pegs you bid fair to be impaled, so dizzy did the six inches of wavy mirror make you. How fortunate there was never more, it would have been as bad as a sea voyage! I don't remember anything else either ornamental or useful, except the kerosene lamp with pendent glass prisms which used to hang just low enough to catch your silk hat. Look on that picture, and then on this.

The hall should be about the pleasantest room in the house, cheery, homelike, inviting. At its threshold a man should throw off the perplexities, cares, and work of the day with his overcoat; and after a seance with the world, the flesh, and the devil—otherwise society—a woman should glide into it as a ship into a quiet harbor, saying to herself the minute she enters the room:

"Stay at home, my heart, and rest,
Homekeeping hearts are happiest."

While the stranger within the gates should feel at once the gracious atmosphere of home, and be inclined to answer its "Abandon grief all ye who enter here," with the old Jewish salutation, "Peace be to this house."

What is an ideal hall? Well, if you are blessed with a sizable piece of the roof, this: It should be wide, with all the other rooms opening from it by archways. The floor, of course, hard wood, parquetry

best, even yellow pine in narrow strips, with here and there a rug. Have the ceiling beamed with wood corresponding to the floor and build a high wainscoting around and up the stairs. The walls? Here I'd defy tradition: brilliant scarlet and gold. Red is the color of warmth and hospitality; make it speak for you before you appear to offer your hand in the good old way. Have a fireplace by all means.

To resume, if your stairs are broad and turn, this fire nook might be under them. From the mantel may hang your ornate Chinese gong whereby the household are awakened for a new day. Hall trees and all kindred affairs, no matter how handsome, when hung with dejected coats, make a pretty hall look like an "ol' close" emporium. I think I have solved it: A tiled vestibule with seat built in at either

side should precede your hall. This need not be so wide. Have two narrow closets taken off the sides, opening into the hall. The doors can be invisible, the wainscoting forming the bottom, beveled mirrors the top, and there you are, one for the masculine members of the family, one for the ladies.

Boxes with door fronts can be built at the end at a convenient height, for silk hats and bonnets. Inside the doors can be linen cane and umbrella cases, or you can put them with your driving gloves, rubbers—no, let us be swell, gums—and gossamers, into the handsome carved chest seat which should stand against the wall. If this chest is modern it means simply money; if 'tis a Florentine antique, for instance, it means travel; but if it's an actual heirloom, it's equivalent to an American patent of nobility.

PATENTS.

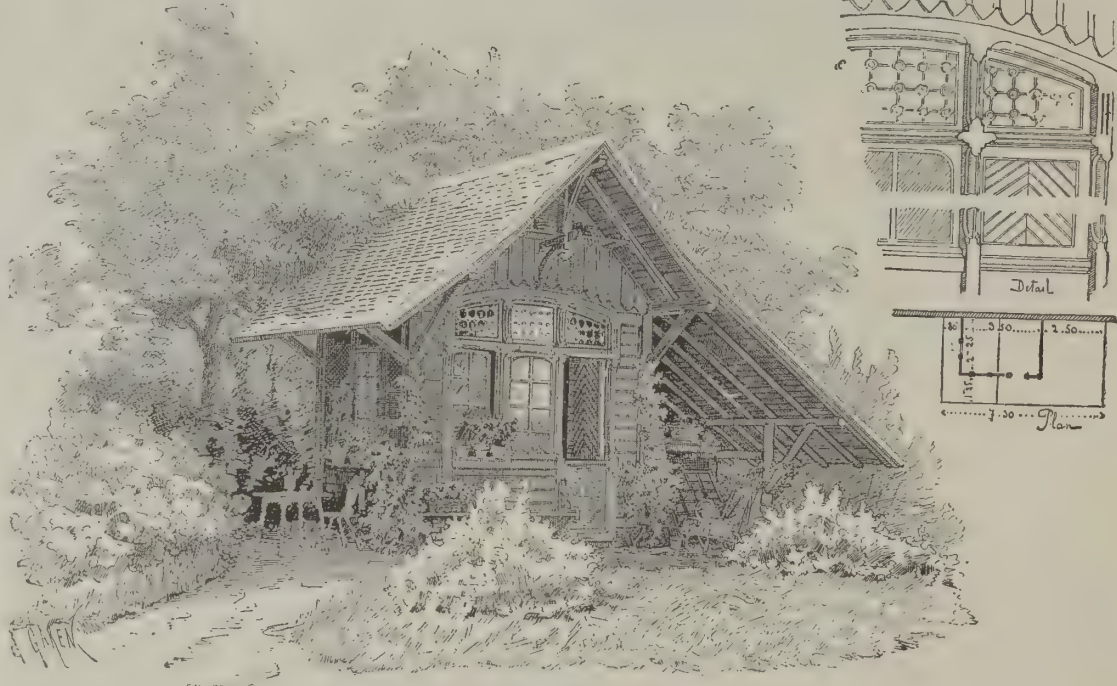
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A GARDENER'S LODGE.

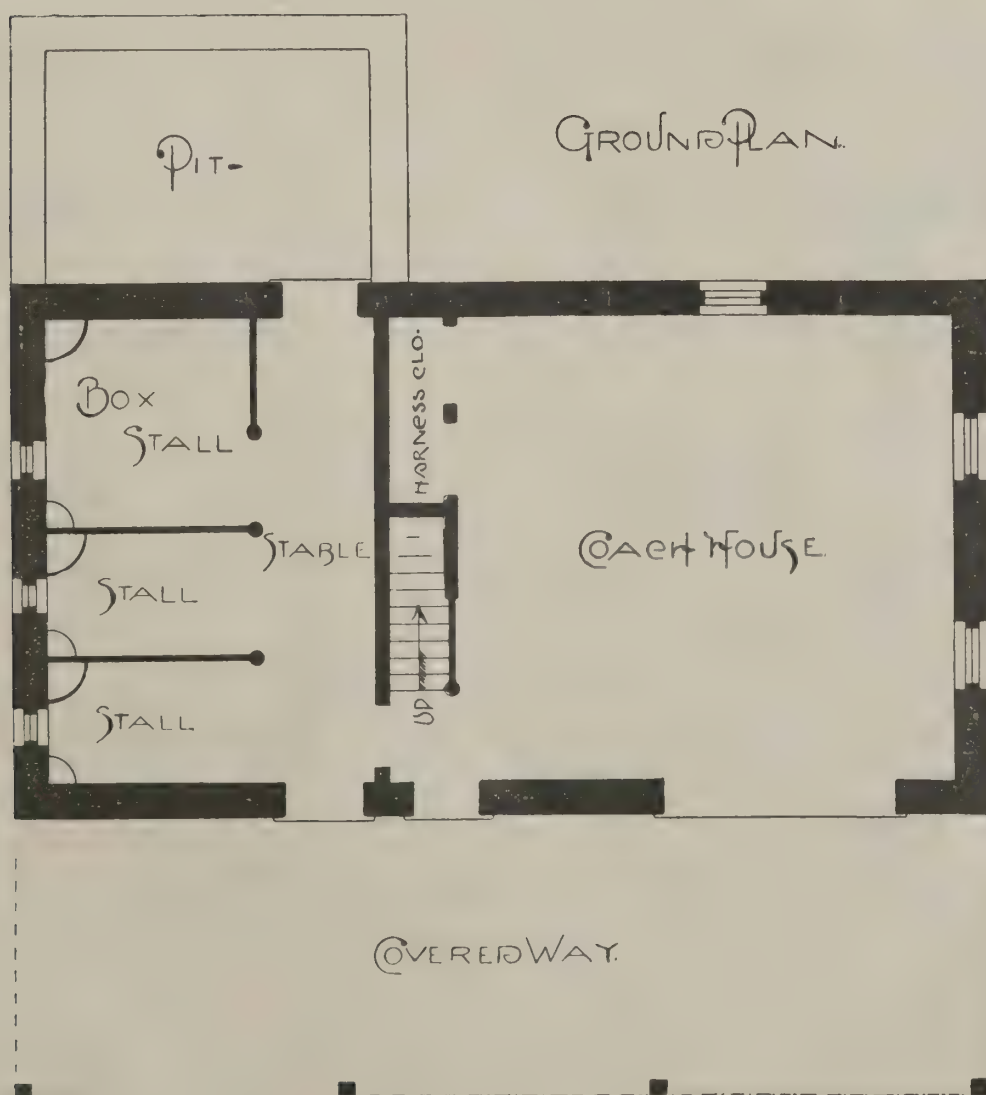
which the designs are usually in floral effects of softly blended tints, there being sometimes several colors of harmonious shades thrown up in pretty groupings on gold grounds. In these, too, there are patterns in large leaves in pale colors running hither and thither over the paper, the veins and ribs being stenciled in with great precision and beauty.

Flock papers are showing raised effects which are marvelous. The contrasts are stronger than ever, too, and striking effects are secured by using different colors in the various layers of flock used to secure the relief effect. Crystalline grounds are used also, on which are raised patterns in light, pale colors. Palm leaves, iris, water lilies and immense flowers are used in designs for this paper. A design showing a flat arrangement of leaves and grasses, upon which is superimposed a flock palm leaf in three layers, the first a shell pink, the second a light tan shade, and the top a creamy white, is very elegant.

Leather papers are handsomer than ever, various effects, such as carved woods, bronze relief, old ivory designs being secured with beautiful exactness. In the patterns all sorts of floral conceits, landscapes, marines, Moorish scroll, birds, animals and insects, glowing with the sheen of gold, silver, copper, or in the metallic colors, give a sort of mediæval splendor to their appearance.

The Hall.

Mr. Palmer Henderson has been writing for a syndicate of daily papers his impressions of the modern house. His fancies are interesting, but not often of much value, for he talks about the homes of that wealthy class who make fads of furnishing their houses and have no limits as to cost put upon them; nevertheless, he makes some suggestions that may be

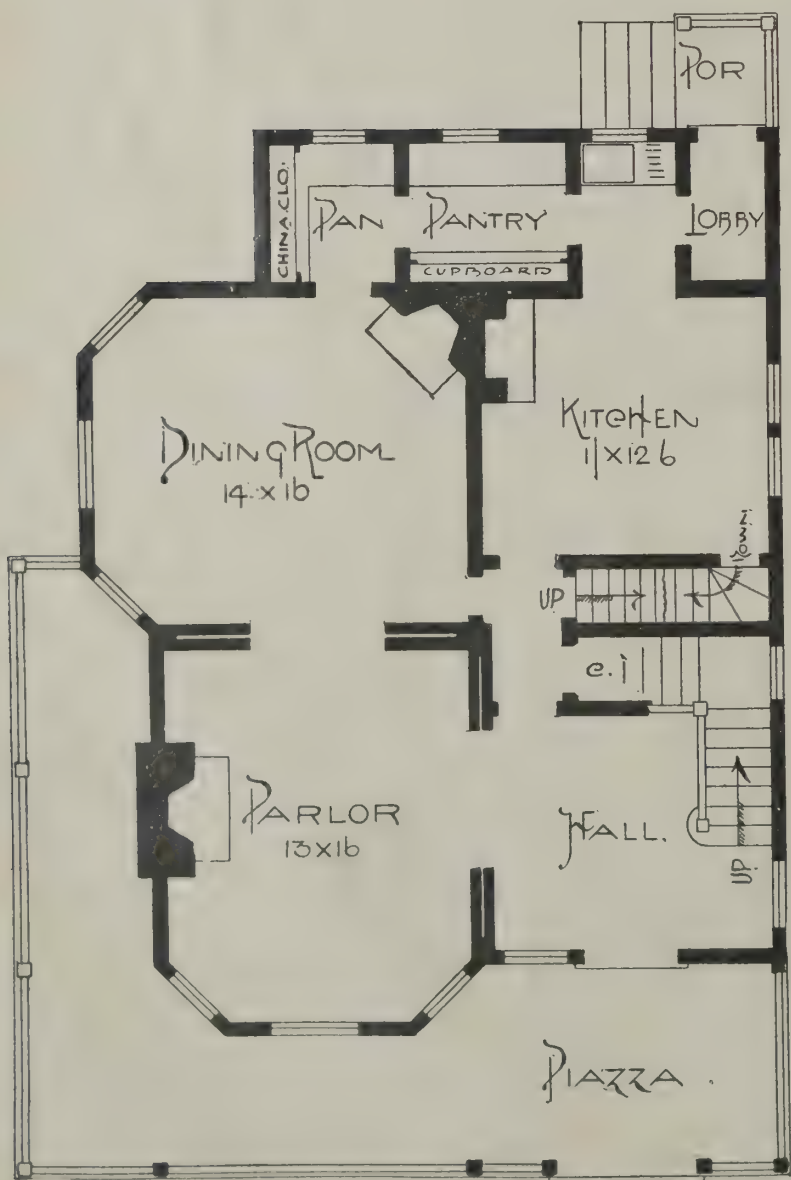


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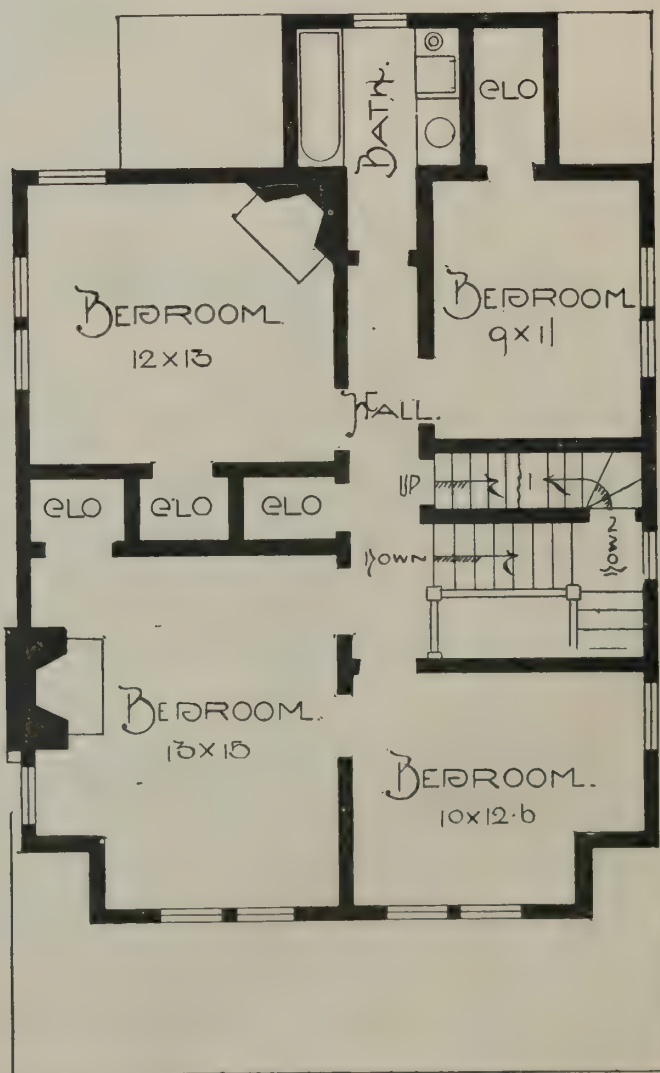
A COACH HOUSE AND STABLE.



SCIENTIFIC AMERICAN.



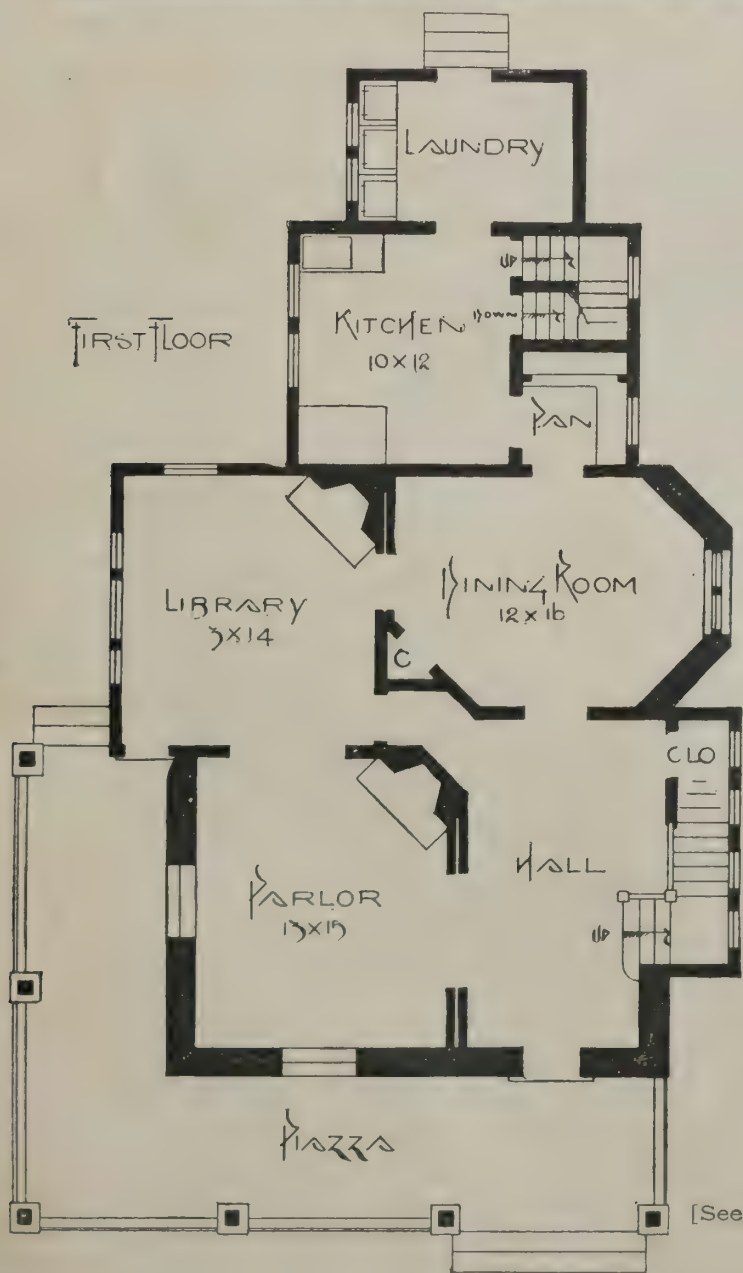
FIRST FLOOR.



SECOND FLOOR.

[See page 8.]

A COTTAGE AT BROOKLINE, MASS.



[See page 14.]

A COTTAGE AT NARBERTH PARK.

A \$1,000 HOUSE.

For this issue the architects, Foster & Pulis, have designed a farm house to cost \$1,000. It can either be a frame structure, or built of brick or adobe. It has six rooms on the first floor, three on the second, with closets, pantries, hall, etc. There are also two rooms in the rear as sleeping rooms for help. The kitchen is planned large enough for cooking and for furnishing a place in which the hired hands can eat. There are both front and back stairs to the house conveniently located. There is a large cellar, which is not shown upon the plans. The house has a roomy porch upon the front and a smaller one upon the back.

The dimensions of the building are: Main front, 25 by 33; rear part, 18 by 27, the latter being but one story in height, but, if needed, can be put up another story at a small additional expense.—*Irrigation Age*.

The Bexley System of Emptying Cesspools.

In small towns or villages in rural districts, where facilities for sewage disposal do not exist, as well as in connection with isolated mansions or cottages, cesspools appear to be inevitable, if we except the alternative of dry-earth closets. Sanitarians are divided in opinion as to the merits of the two systems. While both systems have certain disadvantages, they have at the same time certain advantages, provided that they are constructed and used under proper conditions. To confine our remarks in this brief article to cesspools, it is self-evident that where those receptacles of filth cannot be dispensed with, they should be properly constructed and rendered impervious, and they should also be placed as far as possible from any dwelling. If we mistake not, the model by-laws of the Local Government Board stipulate that no cesspool shall be placed within fifty yards of any dwelling—a very useful stipulation if it be strictly observed. But, assuming that a cesspool be properly constructed and located, something more has long been wanted, viz., a method of emptying it by day or by night without causing intolerable nuisance to the whole neighborhood during the operation.

Such a method has been devised and brought into operation at Bexley and Bexley Heath by Mr. E. Reeve Boulter, the Surveyor to the Bexley Local Board, and recently we had an opportunity of witnessing it in operation at Bexley Heath. Mr. Boulter, of course, does not claim that the whole details of the method adopted by him are novel, but he does claim, and apparently with justice, to have introduced certain improvements on pre-existing methods. He has, however, sought no protective patent rights, but places the results of his practical experience at the disposal of all surveyors and sanitary inspectors and health authorities.

The plant used at Bexley consists of two iron tank vans each holding about 400 gallons; two of Waller's cesspool pumps, 280 feet of leather hose to connect the vans with the pumps, two lengths of suction pipe to connect the pumps with the cesspools, and one hose reel. So far there is nothing novel, except in points of detail.

The vans are made by Messrs. Hora, of Camberwell. Each is provided on the top with a screw-down air-tight manhole (only opened for the periodical cleansing of the van); with a flat Π shaped pipe connection for the attachment of the hose; with a simple automatic cork float indicator to show when the van is nearly full; and with an air cock of special construction to allow of the innocuous escape of air from the interior of the van as it becomes displaced and driven out by the matter pumped into the van. It consists of a short length of metal tubing with a cock surmounted by a metal basin, 5 in. or 6 in. in diameter; this basin or cup is in its turn surmounted by a hinged wire-barred cap or cage. The basin or cup, and, indeed, the whole of the space within the cage, is filled with wood shavings and chips saturated with "Sanitas" fluid, and kept moistened as often as may be necessary. When the van is about to be pumped into, this air cock is opened, allowing the air expelled to pass through without the least offense to the nearest passerby or to the nearest house with open windows. The hose may, if necessary, be brought through a passage or room without causing any nuisance.

The *modus operandi* is to open the cesspool, pour in a sufficient quantity of deodorizing fluid, consisting of manganate of soda (a green powder) diluted with water, and then to stir the whole contents with a pole so that they become thoroughly mixed; such is the

power of the deodorant that this operation is rendered inoffensive to the sense of smell. The suction pipe is then inserted, and the contents of the cesspool pumped into the tank van. Should one van become full before the cesspool is empty, of which fact the float gives indication, the order is given to cease pumping for a moment, and the end of the hose is disconnected from one van and connected to the other, an ingenious metal diaphragm arrangement coming into play to retain the contents of the hose pipe, even though the latter be placed in a recumbent position. The vans when full are taken on to agricultural or market garden land, and the contents discharged into plow furrows as the van travels along. The arrangements for discharging the contents consist of a short length of hose depending from an opening 7 in. in diameter in the bottom of the van and toward the rear. This opening is stopped by a conical ground-in plug, raised or lowered by a rod and screw from the top of the van. To facilitate the complete emptying of the van, there is an arrangement for slightly tipping it.

At Bexley the work is carried out by the Local Board staff, under the direction of the surveyor, at a moderate scale of charges, £1 1s. being charged for emptying a cesspool containing not more than 1,200 gallons, graduated up to £3 5s. for a cesspool of 3,000 gallons

graph of the building taken specially for the SCIENTIFIC AMERICAN.

Decorative Don'ts.

Mr. H. S. Fleming has contributed a few Don'ts to the *Decorator and Furnisher* which, it will be observed, are all in the line of economy and simplicity, and therefore all the more worthy of commendation. They might be summed up in two words: "Don't overdo." He says:

Don't furnish a north room in blue or any cold color. Yellow or golden brown hangings will produce the effect of perpetual sunshine.

Don't make a narrow door narrower by a heavy portiere. A small house is made stuffy by too many hangings.

Don't put chandeliers in a low-ceilinged room. Side brackets are fashionable, and are to be had in artistic shapes.

When the family lounge needs a new cover, don't have it reupholstered. Buy a Bagdad portiere to put over it, and invest a little money in three or four cushions covered in India silk. With portieres at five or six dollars apiece this method is economical as well as fashionable.

Don't buy furniture which has so much decoration that it affords refuges for dust. Jig saw effects should be avoided.

Don't have too much of one kind of decoration in the house. Grille work and stained glass repeated in more than two rooms becomes monotonous.

Don't buy a bright-colored carpet to put into rooms where the furniture is not to be correspondingly toned up. A "cheerful" assertive carpet will often make everything else in a room looked faded and itself become the leading object in the room; whereas a carpet should always be a background, and consequently lower in tone than the objects to be placed upon it.

Don't put plush or silk centerpieces on your dining table. Embroidered linen squares are more fashionable.

Don't have the central decoration of the table tall enough to hide the guests from one another. A low silver dish filled with growing ferns will be more effective than the most elaborate epergne.

Don't copy the freaks of the cafes in the folding of napkins or table linen. Good ironing and plain folding should characterize the linen of private tables.

Don't garnish your salad with beet roses. Any form of decoration which suggests the display window of a restaurant should be avoided.

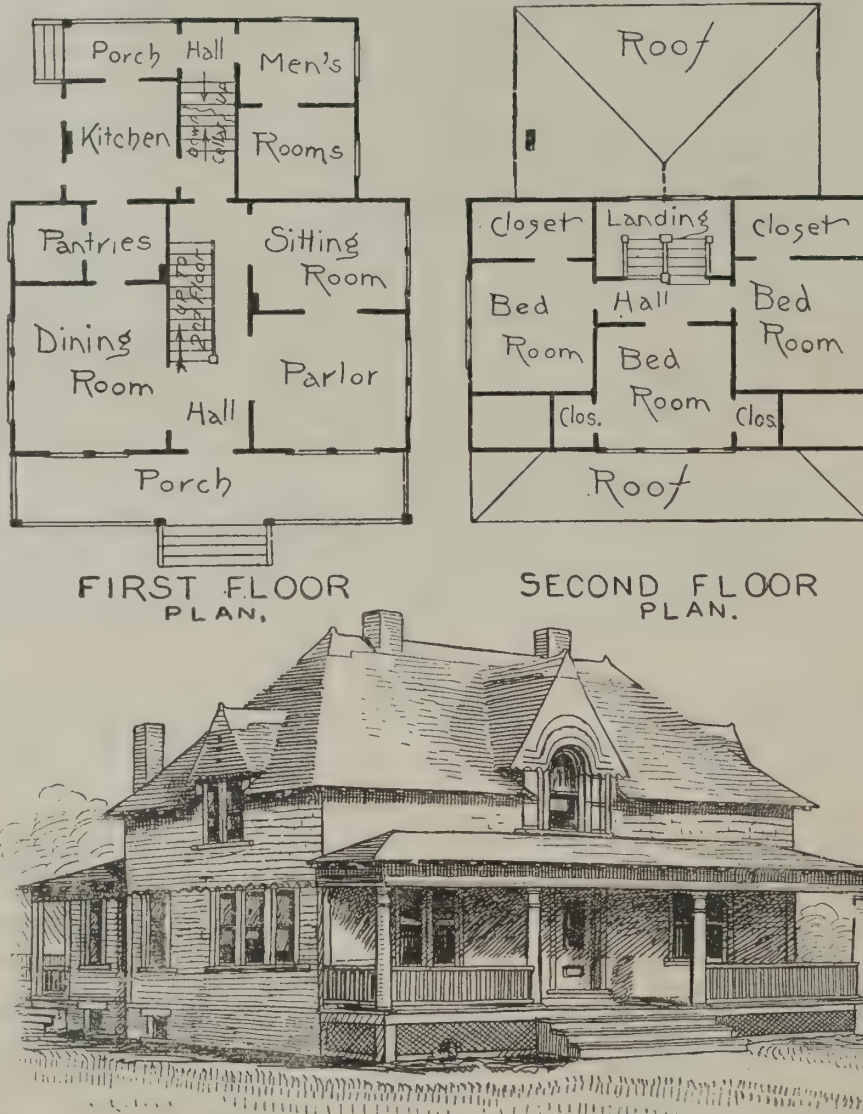
Don't have the floor, wall, and furniture in a room covered with material which has a decided pattern. Too many patterns confuse the eye, which should have some plain spaces to rest on.

Don't put into your rooms unsteady little tables loaded with meaningless bric-a-brac. They are always in the way, and they detract from the dignity of a room.

Heat from the Moon.

Mr. C. Vernon Boys has been making measurements of the heat of the moon by means of his very delicate radiometer. His method was to focus the rays of the moon on the face of the radiometer by a reflecting telescope of 16 inches aperture. In the case of a new moon, he found that the heat coming from its disk diminished as you passed from the convex to the concave edge, and that from the dark surface was so slight as not to affect the apparatus. The maximum radiation of heat came from points of the disk itself, not from its limbs. At full moon the maximum point was at the center of the disk. The side of the moon which had been exposed to the sun for fourteen days was not warmer than that which had been exposed for seven days. No sensible heat was observed to come from the stars.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



A HOUSE FOR \$1,000.

Capacity. Since August 1, 1890, when the system came into operation, nearly 300 cesspools have been emptied by the board's staff.—*The Builder*.

A COTTAGE AT NARBERTH PARK, PA.

We present on page 13 a view of "Elm" cottage, erected by Mr. Geo. Goodman, at Narberth Park, Pa. Dimensions: Front, 32 ft. 6 in.; side, 53 ft., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Underpinning and part of first story is built of rock-faced stone, laid at random. The remainder of the building is of wood, shingled and painted colonial yellow, with bottle green trimmings. Roof is covered with Bangor slates. The several rooms connecting as they do makes a most convenient and attractive interior. First floor is handsomely finished in quartered oak. Hall contains a very pretty staircase, with neatly turned newels. The latter is pleasantly lighted by numerous stained glass windows. Parlor and library are provided with fireplaces, furnished with tiled hearths and facings, and hardwood mantels. Kitchen, laundry, and pantries are trimmed and wainscoted with North Carolina pine, and are fitted up complete in every detail. Second floor contains three bed rooms, den, and bath room, all trimmed with poplar and white pine respectively. Three bed rooms on third floor. Cemented cellar contains furnace and other apartments. Cost, \$4,500 complete.

Our engraving was reproduced direct from a photo-

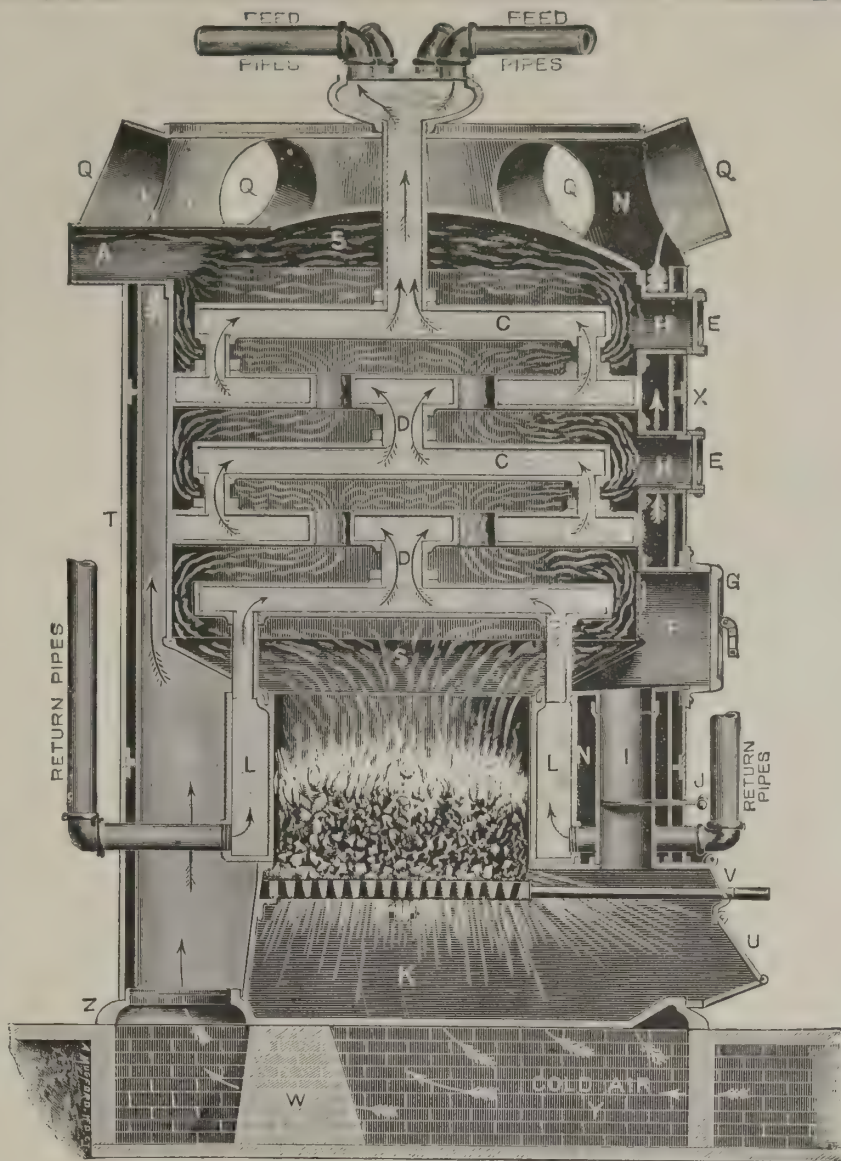
AN IMPROVED HOT WATER HEATER.

The accompanying cut represents a transverse sectional view of the improved Economy hot water ventilating heater, just placed on the market by the J. F. Pease Furnace Co., of Syracuse, N. Y. The principle of the heater is the same as that of the Economy hot water heater, illustrated and described in a former number of this journal, differing only in the construction of the fire pot, which in this heater is hollow instead of solid, and the returns enter the lower part of the pot instead of at the sides of the lowest section. The heater is cylindrical in shape and of about the same principle of construction as the low-down combination steam and warm air heater made by that company. The heater is double cased, with an outer casing of best quality galvanized iron, and the bottom, Z, ash pit, K, fire pot, L, and water sections, C, are made of cast iron, while the jacket surrounding the sectional water heaters, C, is made of No. 6 to 12 wrought plate steel, according to size. The hot water chambers are flat and round (from 2 to 3 inches interior vertical diameter) and are connected to one another by upright connections at the points where the water circulation is shown by arrows. These connections are screwed into shoulders on the chambers, and are lock-nutted thereto over asbestos and lead-filled cup joints.

In the construction of this heater either three or five hot water sections can be used, as the requirements for air, heat, and hot water radiation may demand. (With the solid pot heater above referred to, either one, three, or five sections can be used, so that the heater can be adjusted to furnish more than two-thirds air heat and less than one-third water heat if required.)

It is claimed that these chambers are suspended inside of the combustion chamber jacket in such a manner as not to impair the draught, but to retard the exit of the products of combustion until the heat is entirely yielded. It is also claimed that in this construction the water-heating surfaces are exposed to the highest degree of heat which the combustion produces, and in such a manner as to render no portion of the exposed water-heating chambers waste surface. As each alternate section extends from side to side of the combustion chamber, the products of combustion are forced to traverse over the entire top and bottom surfaces of each section, the heated gas and smoke ascending alternately around the sides of the smaller chambers and through four ample flues near the center of each of the larger sections until the exit flue, A, is reached. The water circulates upward through every portion of the interior of each of the sectional chambers before reaching the distributing feed pipes, passing as many times over the fire as there are sections used.

The ventilating capacity of this heater is concentrated in its warm air producing portion, which saves and makes use of air heat which by nearly all other constructions goes to waste. The air



THE "ECONOMY" HOT WATER VENTILATING HEATER.

supply, which passes through the air warming chamber, N N N, is taken through an air box from the outside, sometimes through a duct sunk in the cellar bottom, and sometimes at the side of the heater, the former arrangement being preferable. The air is thoroughly warmed in its passage through this air chamber, is moistened by water evaporation, and then distributed through pipes and registers to apartments nearest the heater.

Catalogues illustrating and describing this improved

hot water ventilating heater will be mailed to those interested on application to the J. F. Pease Furnace Co., at their main office, Syracuse, N. Y., or their branches in New York, Boston, Chicago, and other places.

ARCHITECTURAL ORNAMENTS AND STATUARY, in sheet zinc, brass, or copper, form the subject of an interesting illustrated quarto catalogue of 112 pages, recently issued by Mr. W. H. Mullins, of Salem, Ohio. The work here shown represents a great variety of patterns, which cannot fail to be of interest to architects and the trade. The perfection which has been attained in the modeling and manufacture of sheet metal ornaments has made their employment vastly more popular than it was formerly, and skilled sculptors and modelers are now employed by the manufacturer to work up any special designs which may be submitted by the architect or others.

IMPROVED STEEL CEILING.

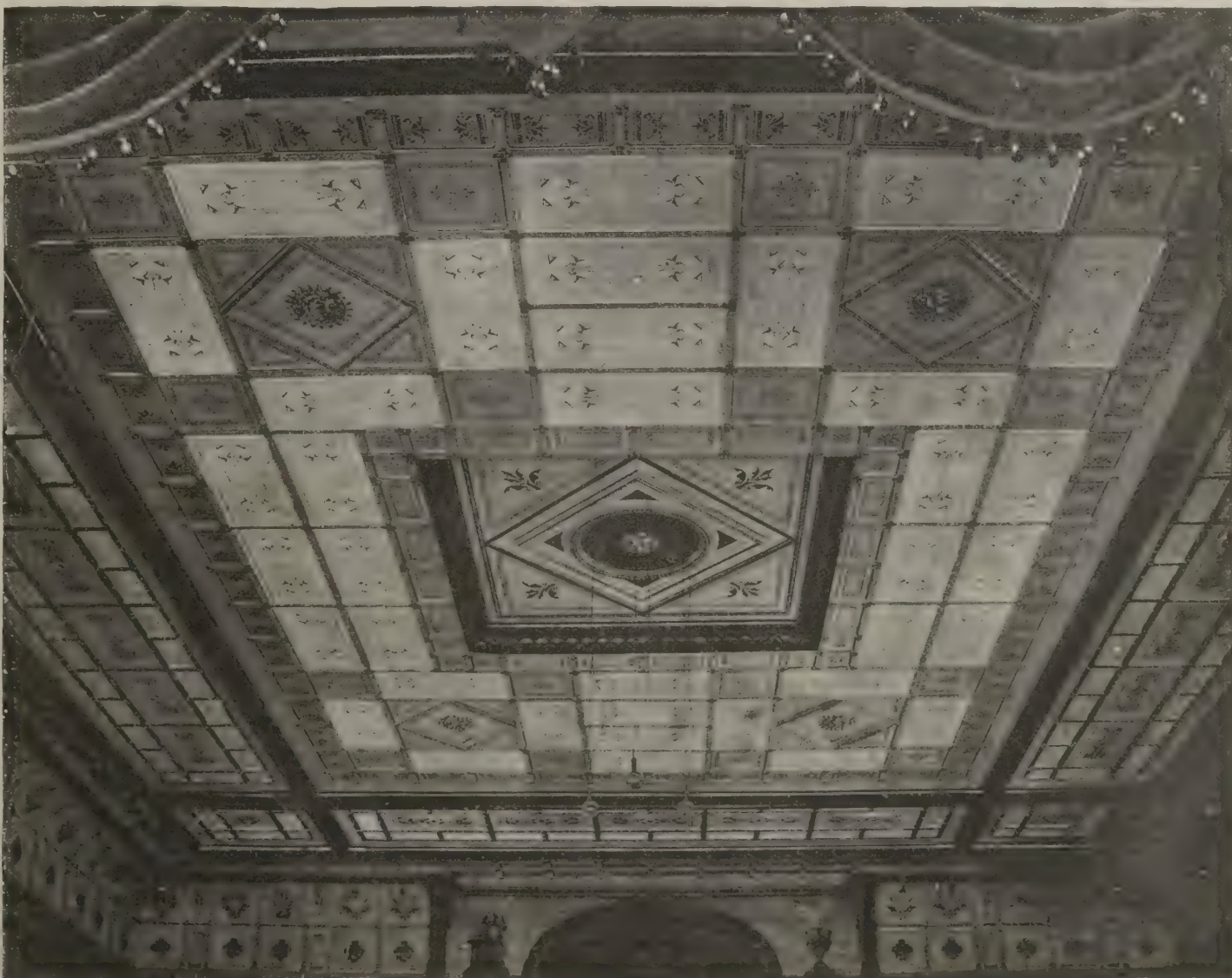
The accompanying illustration represents the use of the Kinnear steel ceiling, made by the Kinnear & Gager Co., of Columbus, O., in a Masonic lodge room at Circleville, in the same State. The room is 43 by 70 feet in size; and the height of the ceiling from the floor is 24 feet. The building was erected about thirteen years ago, and the ceiling of the lodge room was then finished in plaster, the surface being broken with heavy mouldings. But the plaster was defective, portions falling constantly, and the hall had to be abandoned. A committee was then appointed and sent East to find the best metal ceiling, reporting in favor of the Kinnear ceiling. The members are delighted with the result, and the grand master of the State has expressed himself by saying: "It is, without doubt, the finest Masonic

lodge room in the State of Ohio." The company have under way the new Chittenden Hotel, Columbus, O. The ceiling in the lobby and the entire first floor and dining room on fifth floor are finished with the Kinnear ceiling. It presents a very handsome and inviting view. The varied designs in the different rooms are a study of themselves, the effects being heightened by the rare skill of the decorator. This ceiling not only meets the favor of the public, but the insurance underwriters in Chicago, who allow a

credit of fifteen cents on the rate of insurance, while in the District of Columbia twenty cents is deducted on all buildings using the Kinnear steel ceiling. The company have just erected a new factory, covering a space of 100 by 187 feet, to meet the demands of their increasing business.

Foundations under Water.

A German engineer has devised a new method for fixing a foundation under water. By means of a powerful blast of compressed air he drives powdered cement down into the sand or mud at the bottom of a stream. The action of the water immediately fixes the cement, and it becomes like solid rock.



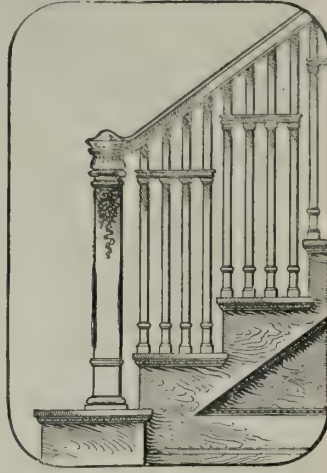
THE KINNEAR STEEL CEILING.—FROM A PHOTOGRAPH.

STAIRCASE AND BALUSTER DESIGNS.

The accompanying illustrations represent a few of many different varieties of stair work, of new and original designs, made by the Willer Manufacturing Company, of Milwaukee, Wis. These designs we copy

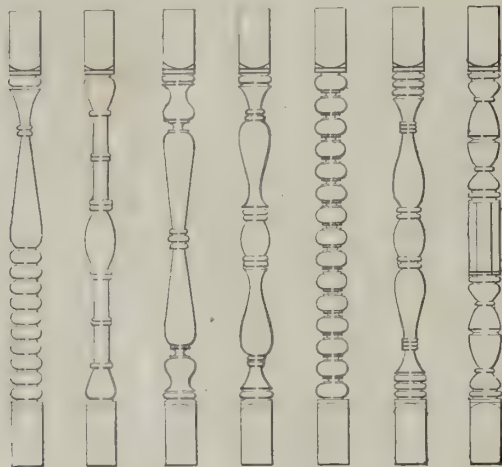
Concrete. Concrete has been largely employed of late in the construction of military works in Austria and Hungary. Mr. Csongvay de Csegey gives some valuable and interesting details in a German military publication.

Mass., the Flower Hospital and College buildings, 63d Street, New York City, Roswell P. Flower's business block, in Watertown, the Odd Fellows' business block, in New Bedford, Mass., the Santa Fe Hospital, Madison, Iowa, St. Paul's Industrial School buildings, in Brook-



WILLER'S ORIGINAL DESIGNS FOR STAIRCASES.

from the special architects and builders edition of their new catalogue, No. 9, a handsome quarto of 132 pages. The firm make a specialty of sliding and folding blinds, window screens and screen doors, and of fine interior hard-wood wood work for first class buildings only, especially the furnishing of fine staircases and stair work. Architects, builders and others are thus afforded the opportunity of obtaining ornamental and artis-



DESIGNS FOR STAIR BALUSTERS.

tie stair work, in which the workmanship is of the first class, without being obliged to make special designs for themselves.

THE CANTON STEEL ROOFING CO., of Canton, Ohio, are manufacturers of the H. W. Smith patent folded lock seam steel roofing in Bessemer steel, Siemens-Martin steel, galvanized steel, and patent calaminated steel, the sheets being 27 by 96 inches in size and No. 26 American gauge. The sheets are thoroughly painted on both sides by machines which paint both sides at the same time, the best iron oxide paint being used, the paint acting as a cement to make the joint more secure and watertight. The same company also manufacture corrugated iron roofing, siding and ceiling, beaded iron siding and ceiling, iron weatherboarding, corrugated and plain conductor pipe, steel and wire hangers, strainers, etc., particulars of which will be found in a catalogue which they send on application, to architects, builders, and others interested.

ENRICHMENTS FOR MOULDINGS, FRIEZES, ETC.

The accompanying illustrations of stamped metal work are from the 1891 edition of the catalogue of Mr. William



STAMPED METAL WORK.

H. Mullins, of Salem, Ohio. The background for the scrolls may be made narrower or wider, at the option of the customer, according to the effect desired in the rooms being finished. In mouldings, friezes, belts, scrolls, etc., the catalogue offers a wide variety from which to make selections.

the "Perfect" hot water heater as being correct in principle, and proving itself to be practically a most powerful heater. These boilers are heating buildings that contain anywhere from 5,000 to 850,000 cubic feet. They are being used in the Polytechnic Collegiate Institute, in Brooklyn, the Cooley Hotel, Springfield,

ever first-class work is called for, having been used on many notable structures, among the latter being the elegant and spacious Mary Drexel Home just completed. The brand has been registered, to prevent imitations. The company are also dealers in tinSmiths' supplies of all kinds.

He assigns as the amount of beton which, under certain rules laid down by him, can be mixed and utilized by the hand labor of a party of seven men, a total of 8 cubic meters per day, or 1.14 cubic meters (40.26 cubic feet) per man. If the amount of work to be carried out reaches 4,000 cubic meters, it will be generally cheaper to substitute mechanical power for hand labor in mixing. By the use of a plant consisting chiefly of a combined mortar mill and cylindrical mixing apparatus five men can produce 77 cubic meters of concrete (beton) daily, or about 49½ cubic feet per man. A useful hint is given as to stuccoing. It is said that if the stucco is not applied immediately the boards are removed from the face of the concrete, the process had better be omitted altogether, as it is difficult to get the stucco to adhere. In cases where the concrete has to withstand water pressure, it is desirable to coat the surface with a mixture consisting of 1 part cement, 1 part sand, and one-fourth to one-sixth part of slaked lime.

ONE of the principal reasons why the ornamental hardware of a building often receives less attention than it should is the fact that it is left almost until the last moment and then hurried through in order that the work may be finished.

There is no good reason why the subject should not be taken up quite early enough in the course of the work to enable a careful discussion and examination of all branches of the work to be made, and the orders placed so that the articles may be ready when needed, instead of being ordered at that time, and then driven through with a rush.—*Trefoil*.

THE RICHARDSON & BOYNTON HEATER.

In the Richardson & Boynton "Perfect" hot water heater, shown in the illustration, the water flows in a solid body from the inlet to the outlet of the heater, and the same water flows around the fire once and over the fire six different times. The amount of direct fire surface is unprecedented, being 85 per cent. of the total surface in the boiler; only 15 per cent. of the total surface is flue surface. It is the direct acting fire surface in a boiler that is effective; it is a necessity to accomplish results in heating. The fire actually shines on 85 per cent. of the boiler surface, and the water comes in direct contact with 85 per cent. of the boiler surface. Some of the best heating engineers throughout the country, who have had experience in not only steam but hot water, have acknowledged the construction of



THE RICHARDSON & BOYNTON HEATER.

& Boynton Co., No. 234 Water Street, New York, and No. 84 Lake Street, Chicago, and parties interested in the question of heating would do well to correspond with the manufacturers, who will be glad to advise with them what is necessary in order to heat any size building, be it large or small.

THE "PENNSYL" Old Methodterne plates, of the well-known firm of Gummey, Sperry & Co., of Philadelphia, advertised in another part of this paper, have long been conceded to be among the very highest grades of tin plate manufactured. They are guaranteed to be perfectly assorted and rolled true to gauge, and to contain all the coating that it is possible for any plate to hold. They are, of course, selling very largely where

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AND BUILDERS

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A RESIDENCE ON RIVERSIDE PARK, N. Y.
[See page 18.]

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A. E. BEACH.

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THE

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ARCHITECTS AND BUILDERS EDITION.

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This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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No other building paper contains so many plans, details, and specifications regularly presented as the SCIENTIFIC AMERICAN. Hundreds of dwellings have already been erected on the various plans we have issued, and many others are in process of construction.

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HOUSES OF MODERATE COST AT NEWARK, N. J.

One of our colored plates this month illustrates a row of four moderate cost houses, designed by Munn & Co., and erected for Mr. J. H. Shafer, 139 Monmouth Street, Newark, N. J.

Dimensions: Width of the entire front, 64 ft. 8 in., and the depth, exclusive of porches, 49 ft. 5 in. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second story, 9 ft.; third, 8 ft. The entire building is constructed of wood, except the front to the height of the windows, which is built of rock face brown stone. The platforms and front steps are fine tooled blue stone surmounted with wrought iron guard rails. The exterior is painted in two shades of red. Roof slated on the steep parts and tinned on the flats. There is a cemented cellar bottom throughout. The cellar for each house contains improved hot air furnace, wash trays, servants' water closet, cool room, etc. Vestibules have tiled floors. The interior is finished in the natural with white pine. The fireplaces have neat tiled hearths, hard wood mantels and mirrors. The end houses have three bed rooms on the third floor for each, middle house has two each. One particular feature is the planning of the stairways, which economizes in room, and has a good effect. The cost of the four houses was from \$16,000 to \$18,000. Our plate was prepared direct from a photograph of the buildings specially taken for the SCIENTIFIC AMERICAN.

A RESIDENCE ON RIVERSIDE PARK, N. Y.

We present as the subject of one of our colored plates in this issue the beautiful and substantial stone residence of S. Clark, Esq., on Riverside Park, New York, from plans prepared by Mr. Henry Kilburn, architect, same place. It presents a noble appearance, and is harmoniously proportioned. Dimensions, 43 by 60 ft., exclusive of all porches. The location is one of great beauty. The house overlooks the Park and the Hudson River. The first, second, and third stories are built of rock faced Indiana limestone, with panels carved in stone, and the fourth story having a French roof, covered with red Spanish tiles and finished with a terra cotta cresting and finials. The striking features of the exterior are the corner tower, "Romeo and Juliet" balcony over oriel bay, and the pleasant porches on either side of the building. The ceilings are of good height. The basement, 8 ft. 6 in.; first story, 11 ft.; second, 10 ft.; third, 9 ft.; fourth, 8 ft. 6 in. The plan is excellent, and the feature of the interior is the arrangement of the various apartments, which is most admirable. The entrance and drawing room conveniently located at side, while the living apartments, library and dining room, are placed on the river front. Vestibule has a tiled floor, ceiling beams, and a paneled wainscoting. Hall, 12 feet wide, is finished in antique oak; it has a paneled wainscoting, beveled plate mirror, and a staircase with posts elegantly carved, extending to ceiling; between the posts are carved brackets, forming Gothic arches. The floors throughout are of hard wood, highly polished. The drawing room is finished in the "Renaissance" style, and is treated with white and gold in a most delicate manner. The fireplace is furnished with a hearth and facings of Mexican onyx and marble. The library is finished in mahogany. The feature of this apartment are the bookcases, which are built in flush with wall; the space at window openings provided with seats, and upholstered in crimson plush, with pleasing effect; there is also a fireplace with a tiled hearth, Mexican onyx facings, and a carved mantel. Dining room is treated in the colonial style, and is trimmed with antique oak; it has a ribbed ceiling, wainscoting, and fireplace; china cabinets are built in each corner, with beveled glass doors. The fireplace, built of brick, has a hearth of same, and a carved oak mantel with mirror, etc. Office and den are trimmed with oak, and each has fireplaces and closets; the former having a toilet. Butler's pantry is conveniently located, is trimmed with oak and provided with dressers, closets, bowl, dumb waiter, and stairs to kitchen. Second floor contains five spacious bed rooms, dressing rooms, closets, and bath rooms. These apartments are trimmed with sycamore. Bath rooms are paved and wainscoted with white English tiling, and are fitted up replete. Third floor, trimmed with cherry, contains seven bed rooms and bath room. Fourth floor, trimmed with ash, contains a large billiard room, four bed rooms, storage, and bath room. Basement, trimmed with hard wood, is furnished with a French kitchen, laundry, servants' hall, butler's bed room, servants' bath room, furnace, and store cellar, all fitted up in the best possible manner. A second view of the house is given on page 17.

Our engravings were made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

A PENNSYLVANIA COTTAGE.

Our engraving, page 19, presents a cottage recently erected for Mr. U. P. Huston, at Upsal Station, Pa. Dimensions: Front, 34 ft. 6 in.; side, 37 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first

story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. First story is built of Chestnut Hill stone, "rock faced," and laid up at random; second story and roof are covered with shingles. This house is treated in the colonial style, and has a very comfortable appearance, with many pleasing features. The interior throughout is trimmed with whitewood, finished natural. Reception hall is provided with a brick fireplace, and an ornamental staircase turned out of ash, with a stained glass window on landing. Parlor and dining room each have fireplaces, furnished with tiled hearths and hard wood mantels. Floors are of hard wood, laid in narrow widths. Kitchen and pantries are wainscoted, and fitted up in the usual manner. Second floor contains three bed rooms, den, and bath room complete. Two rooms and storage on third floor. Cemented cellar contains laundry and furnace. Cost, \$6,500 complete. Messrs. Cope & Stewardson, Philadelphia, Pa., architects.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A COTTAGE AT NEWARK, N. J.

We present on page 20 an engraving showing a cottage erected for Mr. F. A. Phelps, at Newark, N. J. Dimensions: Front, 35 ft. 6 in.; side, 28 ft. 6 in., not including front piazza. Height of ceilings: Cellar 7 ft.; first story 10 ft.; second 9 ft.; third 8 ft. The design is very picturesque, with its broad piazza, balcony, etc.

The plan is unique. The rooms are fair sized and are well arranged for light and convenience. Underpinning and first story are built of brick; second story is of wood, covered with clapboarding and painted olive green, with bottle green trimmings. All shingle work painted red. Vestibule has a tiled floor. Reception hall, trimmed with cherry, contains fireplace and an ornamental staircase with turned columns rising to ceiling, and space filled with spindle work. Parlor and dining room are trimmed with cherry, and each is provided with fireplaces, furnished with tiled hearths and hard wood mantels. Kitchen and pantries are trimmed and wainscoted with North Carolina pine, finished natural, with hard oil, and are fitted up in the best possible manner. There are four bed rooms and bath on second floor and one bed room and storage on third. Bath room, wainscoted, is fitted up in the usual way. Cemented cellar, contains laundry, furnace and other apartments. Mr. M. Stuckert, of Denver, Col., architect. Cost \$4,963.72, complete.

Our engraving was prepared direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A ROUND END HOUSE.

We present on page 21 an engraving showing a round end house, after the style of old English homes, erected for Dr. W. C. Armstrong, at Wayne, Pa. The design has a very picturesque exterior, a large, well shaded portico and floor plans showing thirteen rooms and bath. Dimensions: Front, 44 ft. 8 in.; side, 39 ft. 6 in., not including piazza. Height of ceilings: Cellar 7 ft.; first story 9 ft. 6 in.; second 8 ft. 6 in.; third 8 ft. Underpinning up to the sills of first story windows is built of field stone, laid up at random; the first story above this is coated with plaster, dashed with pebbles and painted colonial yellow, with quaint effect. The remainder of the structure is covered with shingles and painted red. First floor is finished in antique oak, the doors and windows having beaded casings and turned angle blocks. The floors are of hard wood, laid in narrow widths. The windows are glazed with plate glass, and stained glass is also used, producing good effect. The large, open drawing room with liberal fireplace, yet secluded from hall, is the chief feature in this plan. Fireplace, built of Tiffany brick, has a tiled hearth and an oak mantel of exquisite design. Hall contains a vestibule with a tiled floor and "Dutch" doors, a massive oak staircase, handsomely carved, and a paneled divan. Library and dining room are conveniently located. Kitchen, laundry and its apartments are trimmed and wainscoted with yellow pine, finished natural. These apartments are fitted up in the most improved manner. Second floor is trimmed with whitewood finished natural. It contains five bed rooms and bath room. Bath room is wainscoted and fitted up in the usual manner. Three bed rooms and storage room on third floor, trimmed same as rooms on second floor. Cost, \$5,463 complete. Messrs. F. L. & W. L. Price, of Philadelphia, Pa., architects.

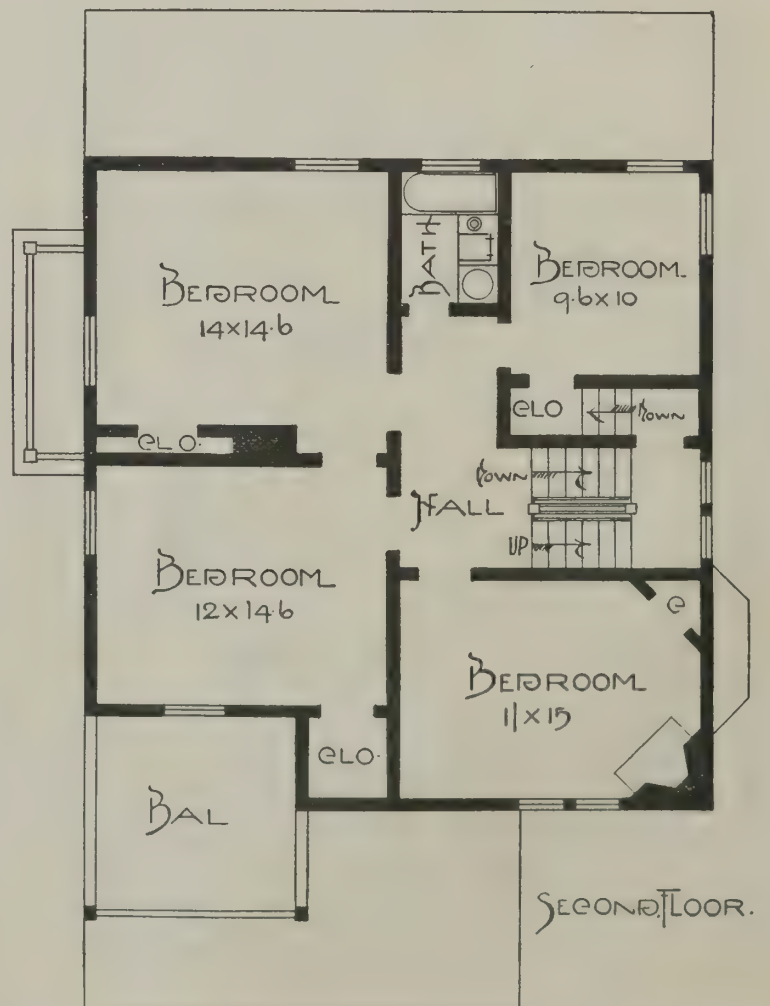
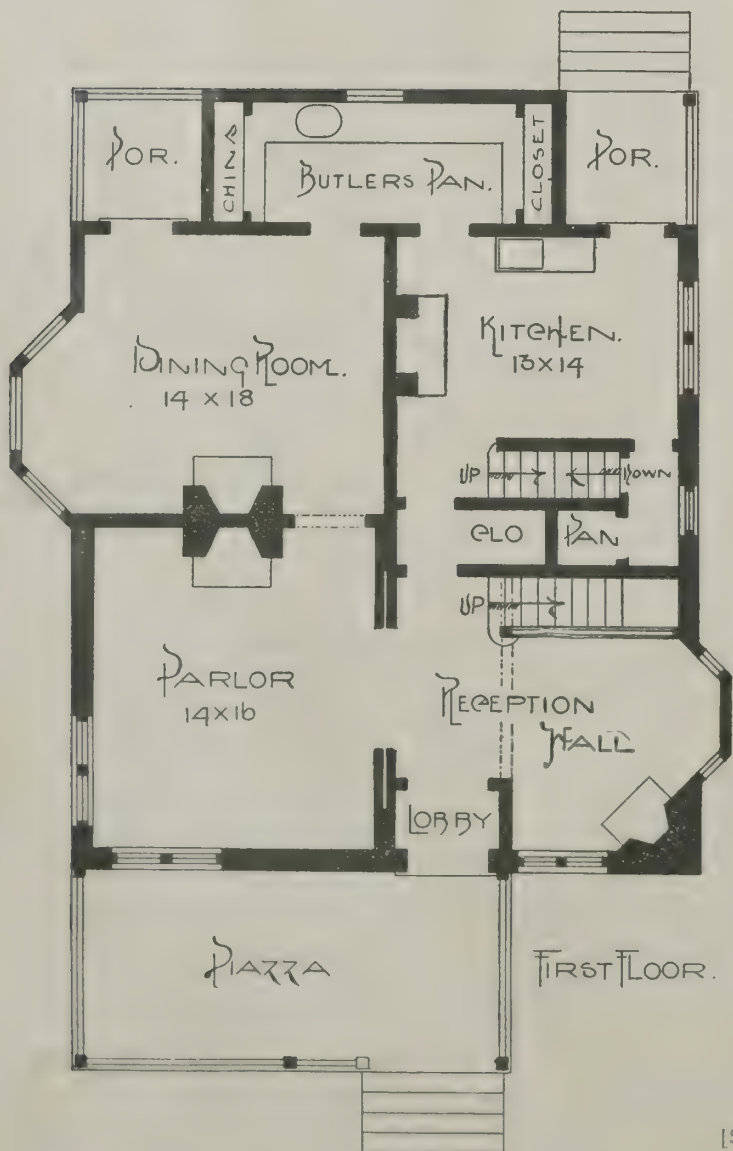
Our engraving was made direct from a photograph of the building taking specially for the SCIENTIFIC AMERICAN.

We were misinformed in regard to the design of the colonial house in our July number, colored plate. It was designed by Rand & Taylor, and the cottage at Brookline, page 12, same number, was not by them.



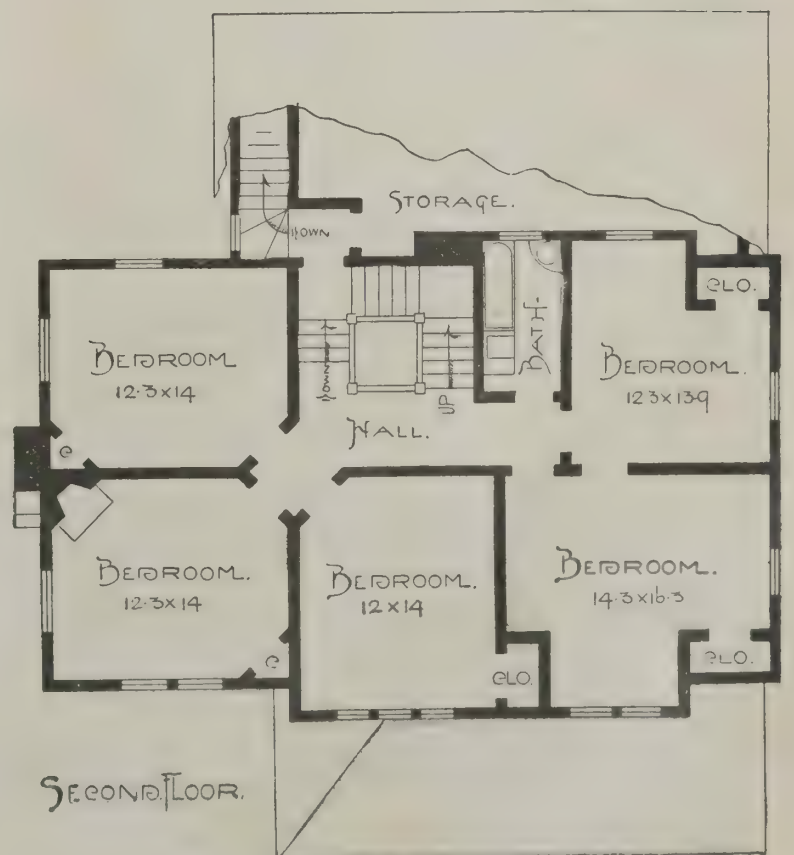
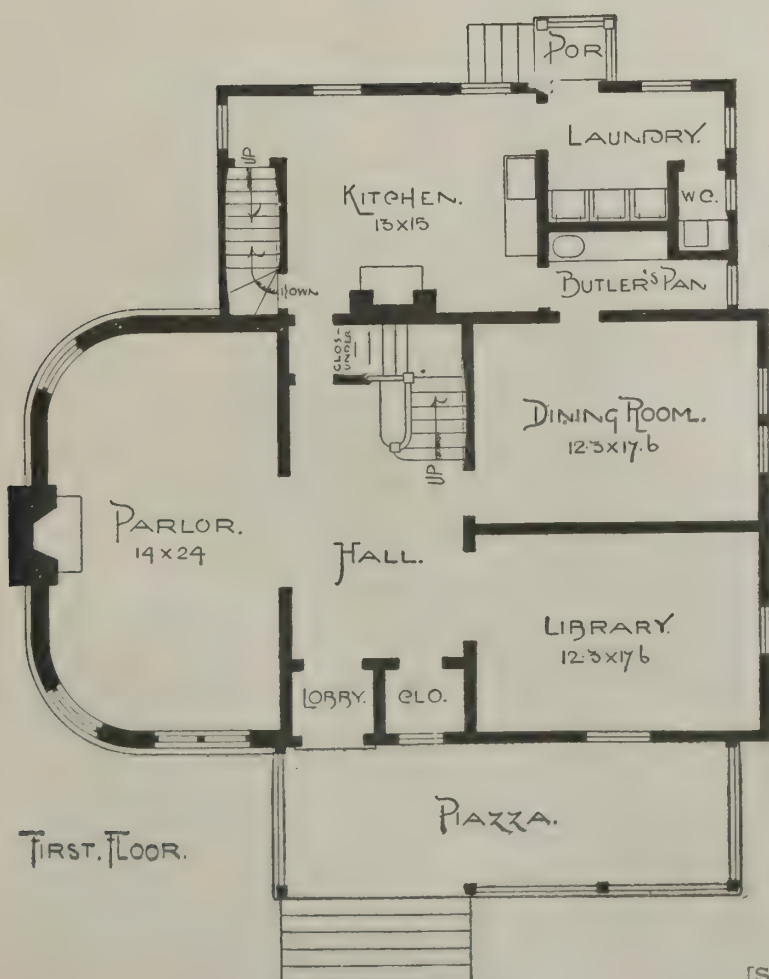
[See page 18.]

A PENNSYLVANIA COTTAGE.



[See page 18.]

A COTTAGE AT NEWARK, N. J.

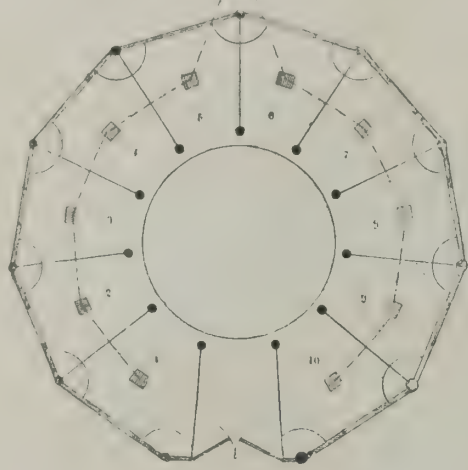


[See page 18.]

A ROUND END HOUSE.

DESIGNS FOR STABLES.

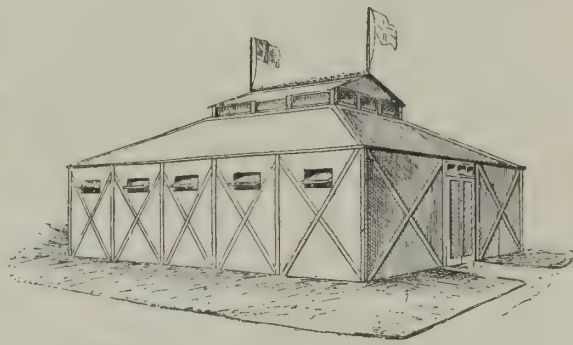
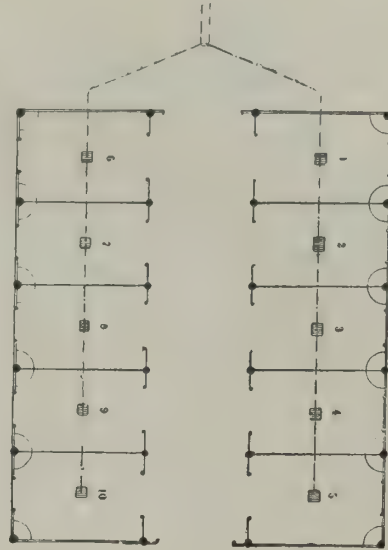
The accompanying designs for stables are by Mr. G. S. Brock, of L'Avenue, Newtown, N. S. W., Australia. By placing the design planned on the square alongside the round building, it will be noticeable at once the great saving in material and room in adopting the plans of the round building, besides providing an exercise or breaking in ring, which is a great consideration to horse owners. It will cost twenty-five per cent. less than a square built stable. If desirable, a water windmill could be erected in the center of the ring, with a surrounding water trough for watering and general washing of stock. This would of course, be only necessary when a permanent water supply was not laid on. The designs of these buildings seem to be very suitable for trainers and owners of racing stock, and can, of course, be erected to any scale of size or material. The exercise ring under cover is a special feature of the design, and could be laid down either with sawdust or tan.—*Town and Country Journal.*



The plans were prepared by Don Genaro Palacios. The building has already been subjected to the test of earthquakes and cyclones, but has suffered no injury.

A RESIDENCE AT BROOKLINE, MASS.

On page 23 we give a residence erected for Mr. Francis Hall, at Brookline, Mass. The engraving, which was



CIRCULAR STABLES.

AN IRON EARTHQUAKE CHURCH, MANILA.

We give from *La Ilustración Española* a view of the new iron church now in process of construction at San Sebastian, a suburb of Manila, Philippine Islands. It is the third structure erected on the same spot within thirty years, both of the others having been wrecked by earthquakes, the first in 1863, and the second in 1881.

The present edifice is intended to be proof against ordinary earthquakes, tornadoes and fires, the whole being built of iron and so tied together with girders and trusses that it will resist strains in all directions.

made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN, presents a very attractive perspective and the plans show a convenient interior arrangement. The underpinning and balustrade to piazza are built of Tiffany (old gold) brick. The superstructure above is of wood, covered with

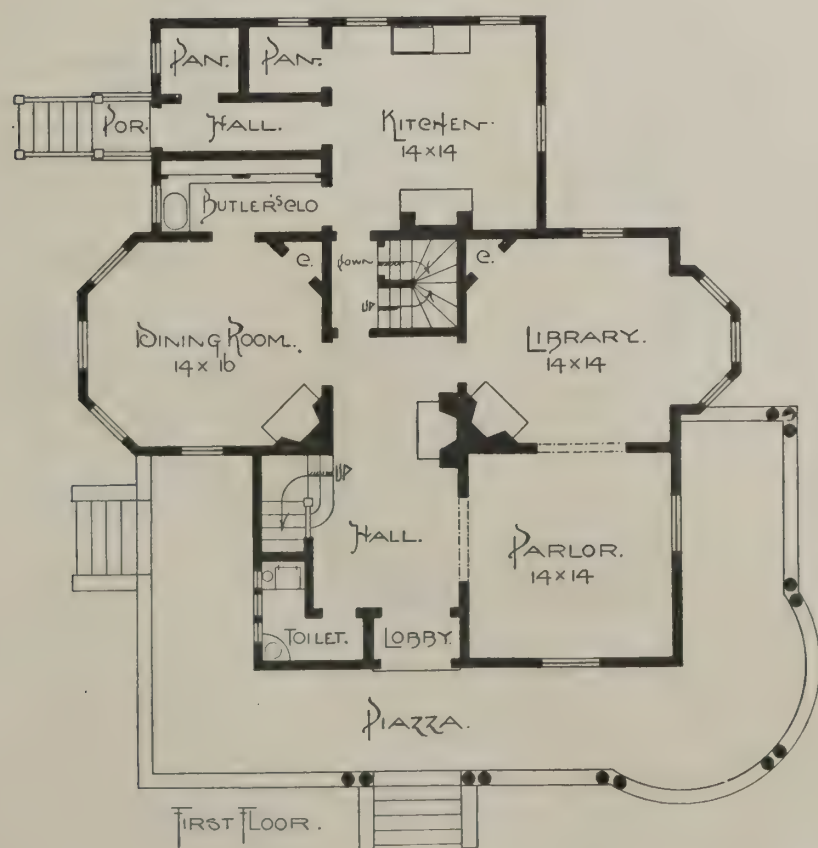
clapboarding and shingles, painted gray (slate color), with trimmings of a darker shade. Roof shingled, painted red. Dimensions: Front 44' 6"; side 44', not including piazza. Height of ceilings: Cellar 7'; first story 9' 6"; second 9'; third 8' 6". Vestibule has a tiled floor. Hall is trimmed with antique oak. It is furnished with ceiling beams, a paneled wainscoting, and a large fireplace with hearth and facings of Mexican onyx and mantel of antique oak. The staircase is provided with carved newels and an oriel bay, thrown out at second landing, with windows glazed with stained glass. Floors of hard wood. Parlor and library are of good size and are trimmed with cherry. The latter provided with a fireplace, built of brick, with hearth laid with same and a brace-brac mantel. Dining room, trimmed with antique oak, is furnished with an open fireplace, china closet, and a paneled wainscoting. Kitchen and its apartments are replete in all their appointments, and are trimmed and wainscoted with hard Southern pine, finished natural with hard oil. Second floor contains five bed rooms and bath room, all trimmed with hard wood. Bath room is wainscoted and provided with tub, bowl, and closet in the best possible manner. There are three bed rooms and billiard room on third floor. Cemented cellar under whole of house, contains laundry, furnace, and other apartments. Heated

by steam. Cost \$10,518 complete. Mr. J. Merrill Brown, architect, Boston, Mass.

To remove ink stains from an oak desk, try a mixture of two parts of cream of tartar and one of powdered alum.

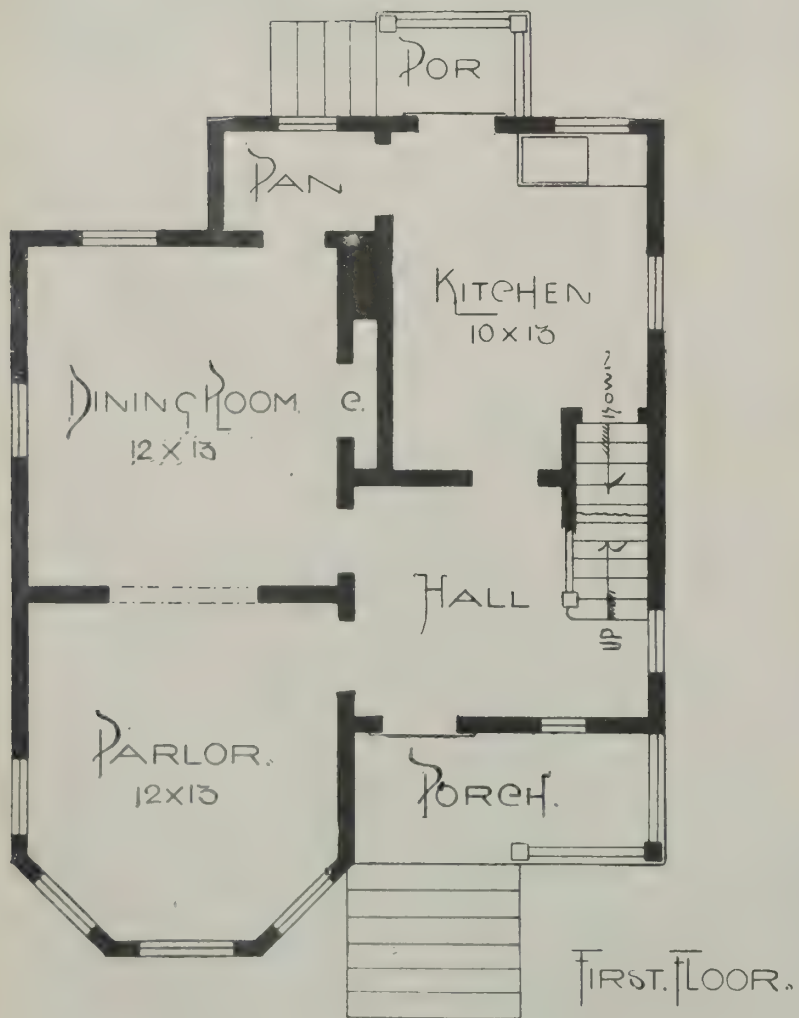


THE IRON EARTHQUAKE CHURCH, MANILA.



[See page 22.]

A RESIDENCE AT BROOKLINE, MASS.

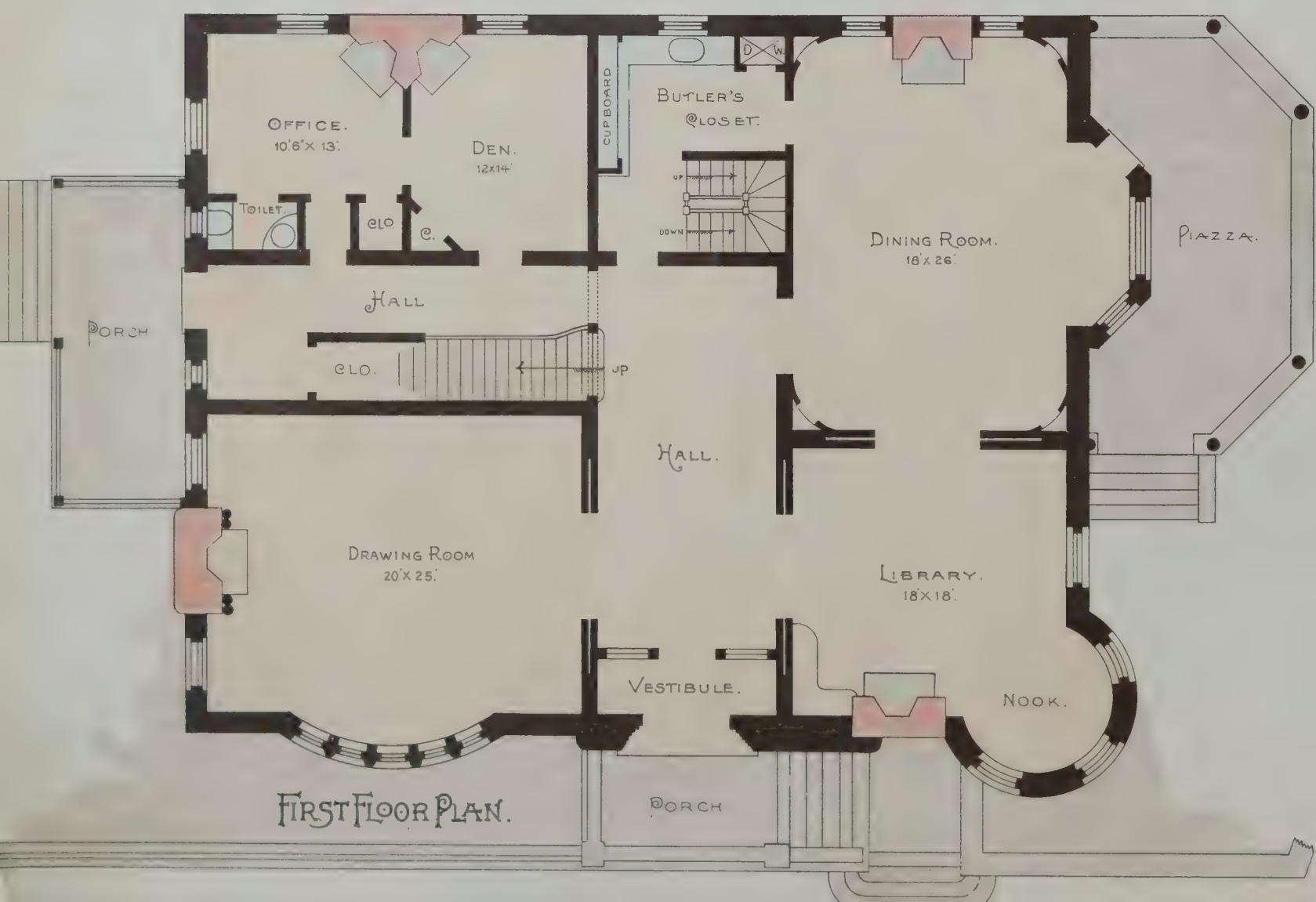


[See page 30.]

A \$1500 COTTAGE.

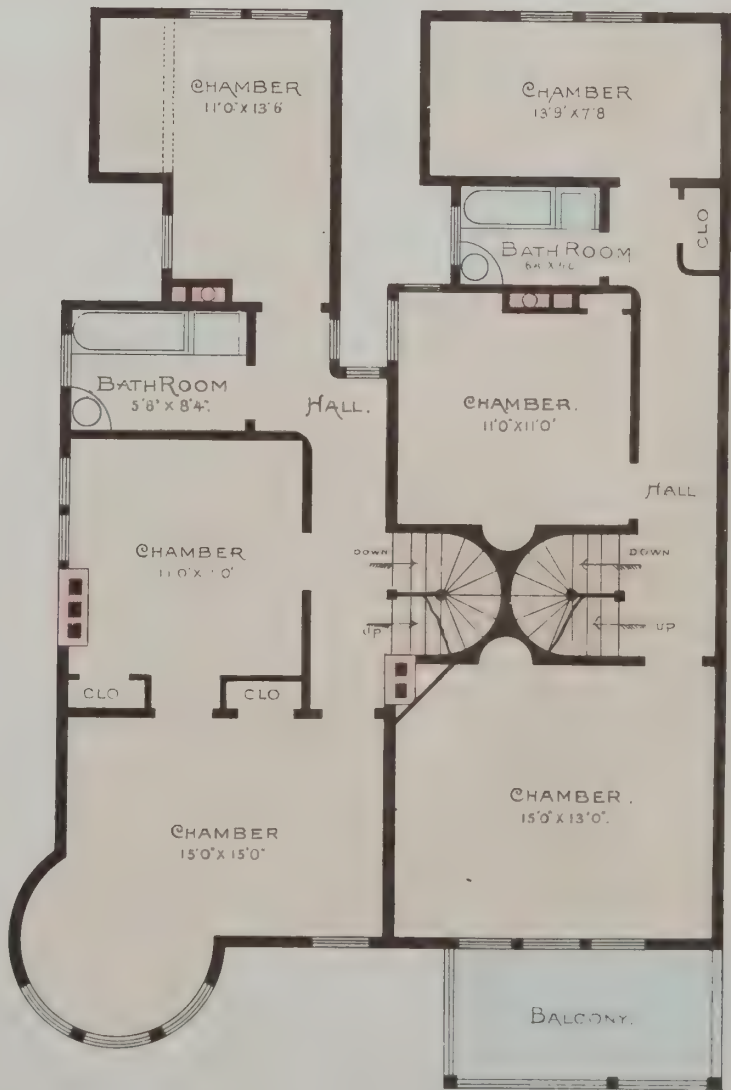
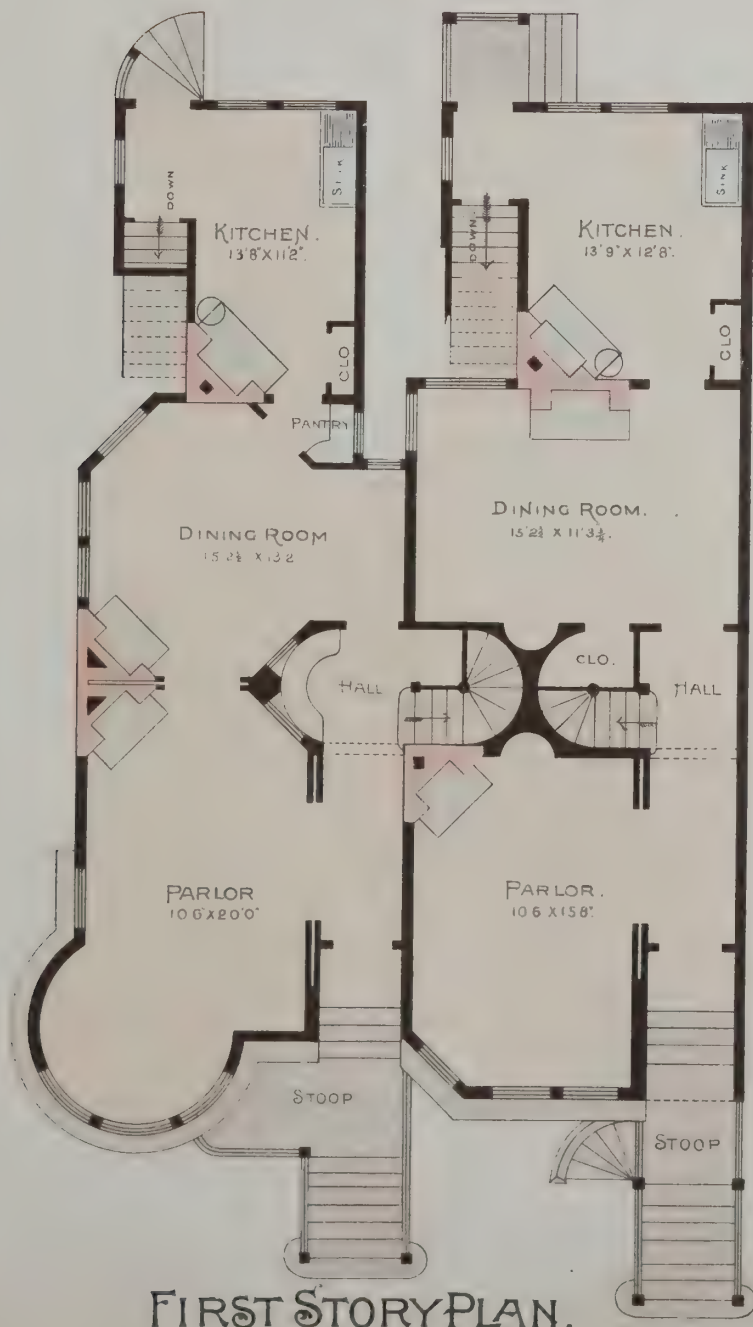


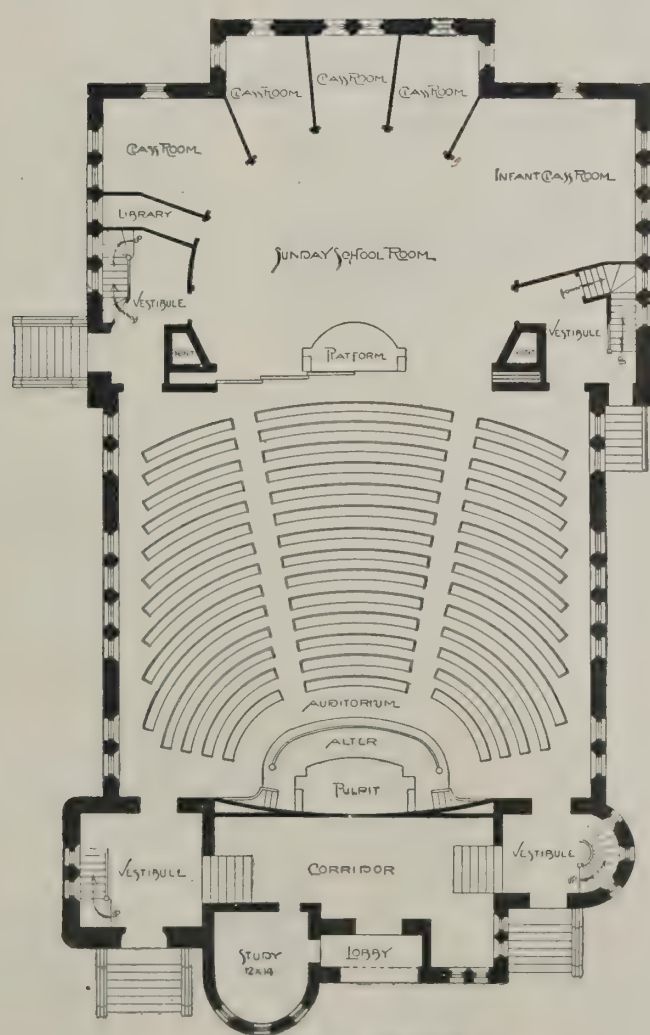
A RESIDENCE ON RIVERSIDE PARK, NEW YORK.



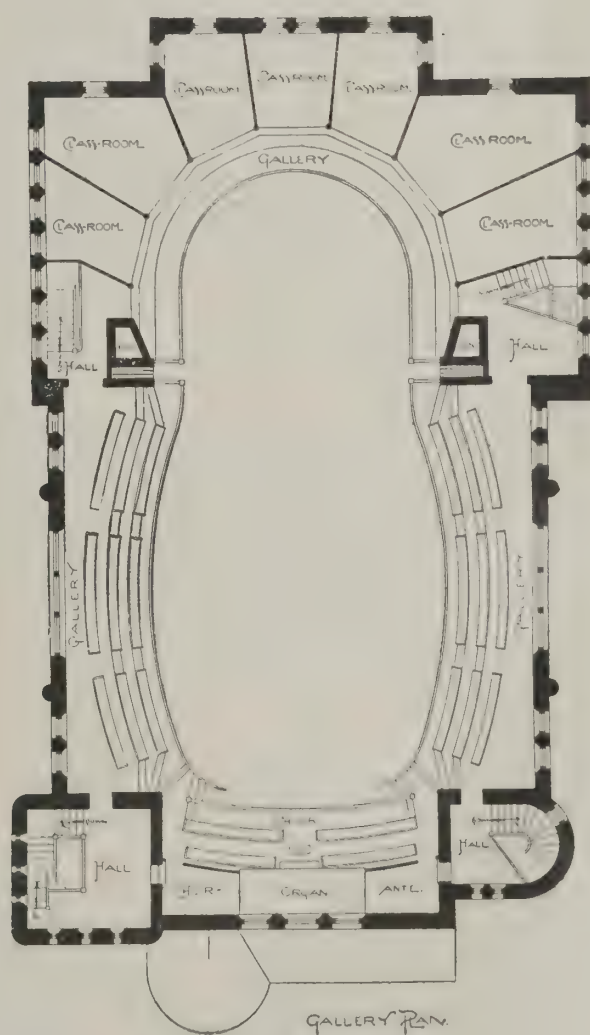


HOUSES OF MODERATE COST AT NEWARK, N.J.





GROUND PLAN
ST JOHN'S CHURCH
NEW ROSHELENY



GALLERY PLAN

[See Page 30.]

ST. JOHN'S M. E. CHURCH, NEW ROCHELLE, N. Y.

THE PABST BUILDING, MILWAUKEE.

The loftiest and most imposing structure in the State will soon rear its massive walls in this city at the corner of Wisconsin and East Water Sts., in the form of Capt. Pabst's magnificent new office building. This mammoth pile will be thirteen stories high, its altitude from the pavement to the apex of the tower being 235 feet. The building will be entirely fire proof, and will be constructed of brown stone, brick, and terra cotta. It is understood, however, that the entire building may be of stone. The first main floor will be occupied by the largest capitalized bank in the State. All of the floor below, except that portion needed for the heating and lighting apparatus, will be fitted up in most elaborate style as a restaurant and saloon. The other eleven stories of the building will be devoted to offices, of which there will be 200. On the first and second floors there will be located the safety deposit vaults, which will have every convenience mechanical ingenuity can suggest, and will be superior to those of any other cities of the West. The elevators will be of the most recent designs and will be very rapid.

The architect of the building is H. Beman, of Chicago, who also designed the Pullman building, Chicago, the Pioneer Press building, St. Paul, and other noted buildings of the Northwest. It is expected to have the structure completed May 1, 1892.

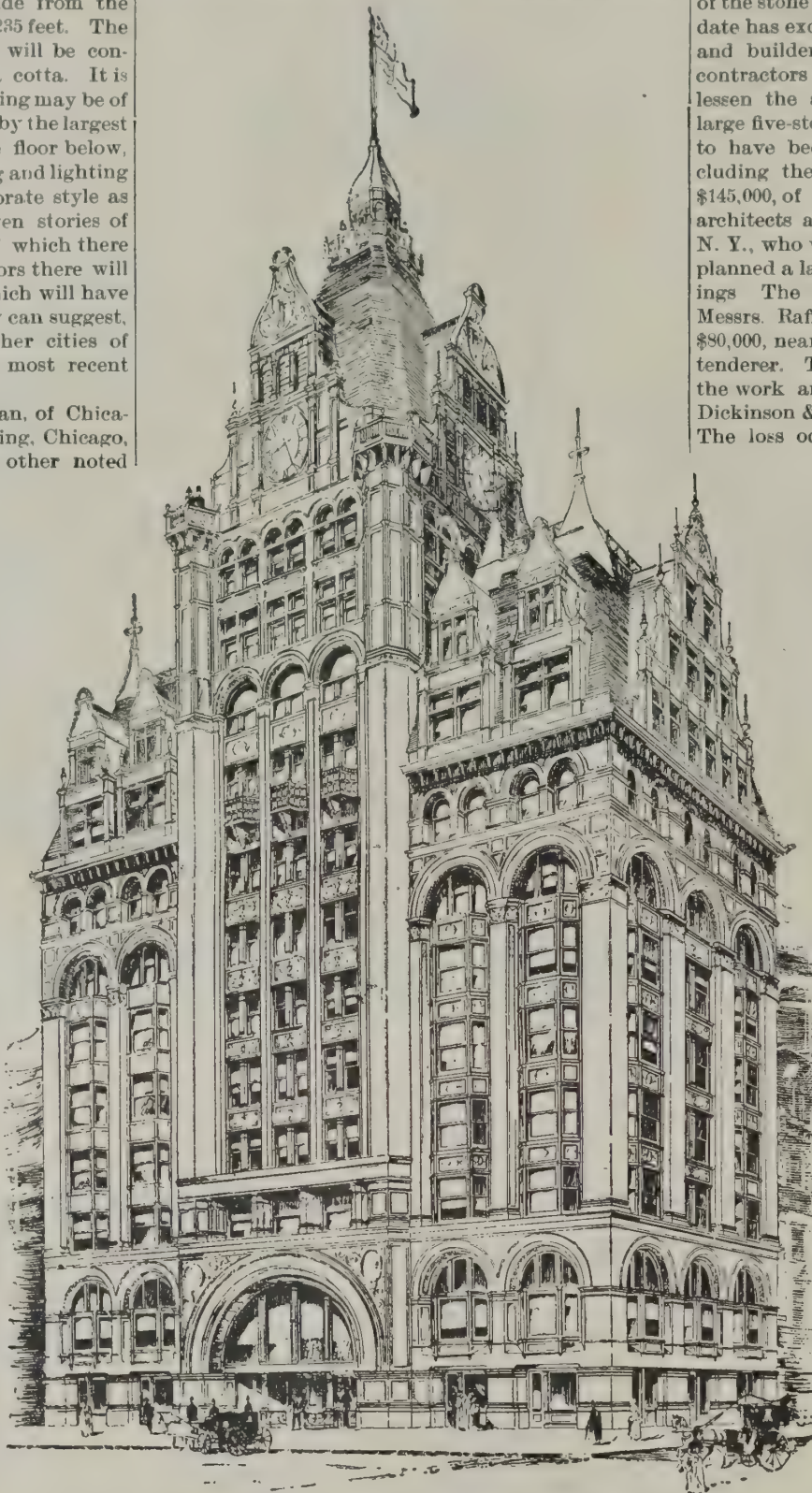
From the dome may be had a fine view of Milwaukee and the surrounding country for many miles, and the building can be readily seen upon every approach to the city, both by land and water. The probable cost of the building is \$500,000.—*Building Record, Milwaukee.*

THE COLLAPSE OF THE Y. M. C. A. BUILDING AT MONTREAL.

The sudden collapse of the interior of the splendid new Y. M. C. A. building, on Dominion Square, just when the work of construction was nearing completion, and entailing as it does a loss estimated at \$5,000 to \$6,000, has excited a great deal of interest, not by any means confined to Montreal. It is a matter of interest to all who are in any way connected with the construction of large buildings, whether for public or other use. The cause of the disaster is a subject of general discussion, and there will, no doubt, be a rigid investigation. The collapse occurred on the afternoon of March 24, when there were nearly forty men at work. That no one was injured is one of the remarkable features of the case. We present plans showing the position of the central pillar which gave way, with particulars of the collapse. While the men were at work on the interior of the building they were surprised by the falling of a brick from the upper story. On looking up they saw the floor slowly sinking, and at once rushed outside. Several persons on the upper floor also had an exceedingly narrow escape. The whole center portion of the interior came tumbling down. Examination later showed that the collapse was caused by the crushing of a brick wall upon which one of the main central pillars rested. There was under the pillar a cast iron plate, 24 inches square by 4 inches in thickness, resting upon a stone flag 32 inches square by 5 inches in thickness. Underneath this was a brick wall about four feet high from the cellar floor. The floor was a solid stone paved foundation. The weight on the pillar caused the iron plate referred to to break into four pieces and the stone flag into three

pieces, and the pillar having no further check went crashing down through the brick wall underneath, splitting it as shown in the accompanying sketch. The pillar was sound, made of hollow metal, eight inches in diameter and one and three-eighths inches

have been excellent. The outer walls remain intact, except that a couple of stanchions were cracked by the settling of the heavy brick columns in front. The accompanying sketch shows the exact position of the pillar and the break in the brick wall, also the fragments of the stone base and iron plate. No event of recent date has excited as much comment among architects and builders, and the fact that both architects and contractors are Americans does not by any means lessen the amount of discussion. The building is a large five-story one begun in the fall of 1889, and was to have been completed in September. Its cost, including the land, which cost \$25,000, is estimated at \$145,000, of which \$80,000 has been subscribed. The architects are Messrs. Fuller & Wheeler, of Albany, N. Y., who were chosen on account of their having planned a large number of American Y. M. C. A. buildings. The contract for building was awarded to Messrs. Rafferty & McAlister, of Syracuse, N. Y., for \$80,000, nearly \$30,000 lower than the lowest Canadian tenderer. The firm was dissolved after beginning with the work and the contract was awarded to Messrs. Dickinson & Allan, of Syracuse, for the same amount. The loss occasioned by the accident will fall upon them.—*Dominion Illustrated.*



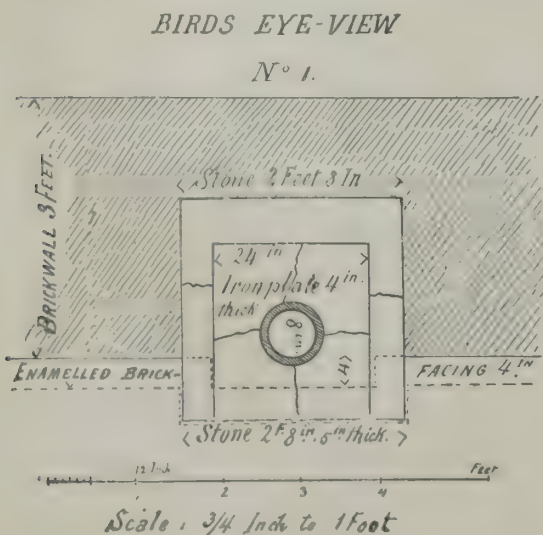
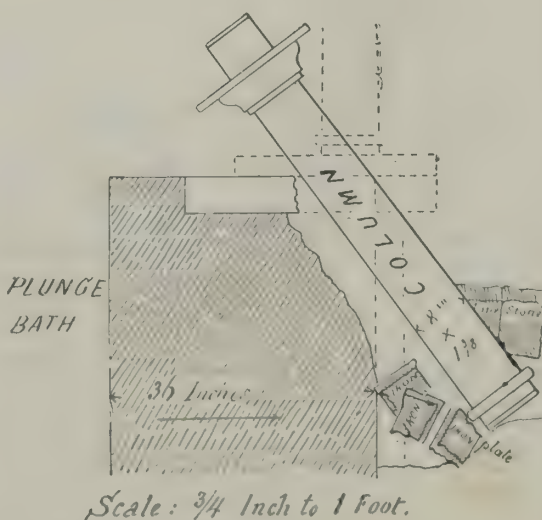
THE PABST BUILDING, MILWAUKEE, WIS.

thick. It rested too close to the side of the wall. Why this pillar was not continued on down to the solid floor, instead of resting on the brick wall, is one of the questions that naturally arise. Had this been done, and the wall built round it, the accident would not have occurred. The architect states that these pillars had been tested to a bearing strength of 170 tons. The workmanship on the building generally appears to

railing, to be taken away in the winter, or can be made to remain permanently in position, if desired. A light framework is fastened to the house above this, of the same length and width, and over this is fitted striped awning cloth. This framework, which can be taken down in the winter, is easily made of light strips of wood and laths, well braced from side to side, secured to small cleats that can be screwed to the side of the house. Such a summer piazza can be made to extend along the whole side of the house, shading both windows and doors, or arranged on a smaller scale, as shown in the illustration.

If the cloth is carefully removed from the frame each fall, and kept well secured during the summer to prevent the wind from tearing it, several seasons' wear can be had from it, though it can be replaced at a trifling cost.—*Webb Donnell, in Country Gentleman.*

SECTIONAL-VIEW

N^o 1.

THE COLLAPSE OF THE Y. M. C. A. BUILDING AT MONTREAL.

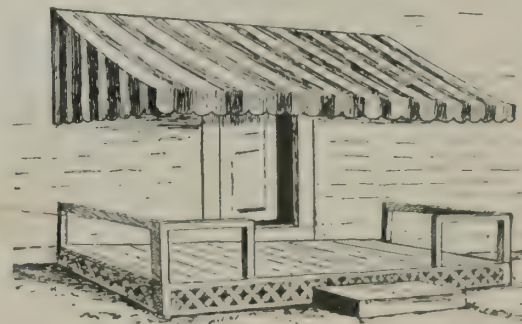
Ancient Mines of Greece.

The United States consul at Athens, in a recent report to his government, gives some account of the ancient metal mines at Laurium. These mines were worked for zinc, lead, and iron, and though worked thirty centuries ago, are still in operation. At Laurium there are 2,000 ancient shafts, each about 7 feet square in section, and from 66 feet to 400 feet in depth. The galleries open into ancient chambers sometimes 30 feet high and 150 feet wide. The amount of material removed has been estimated by M. Cordella at 137,000,000 cubic yards, all of which was raised to the surface on the backs of slaves, about 3,000 of which were constantly employed in the mines themselves.

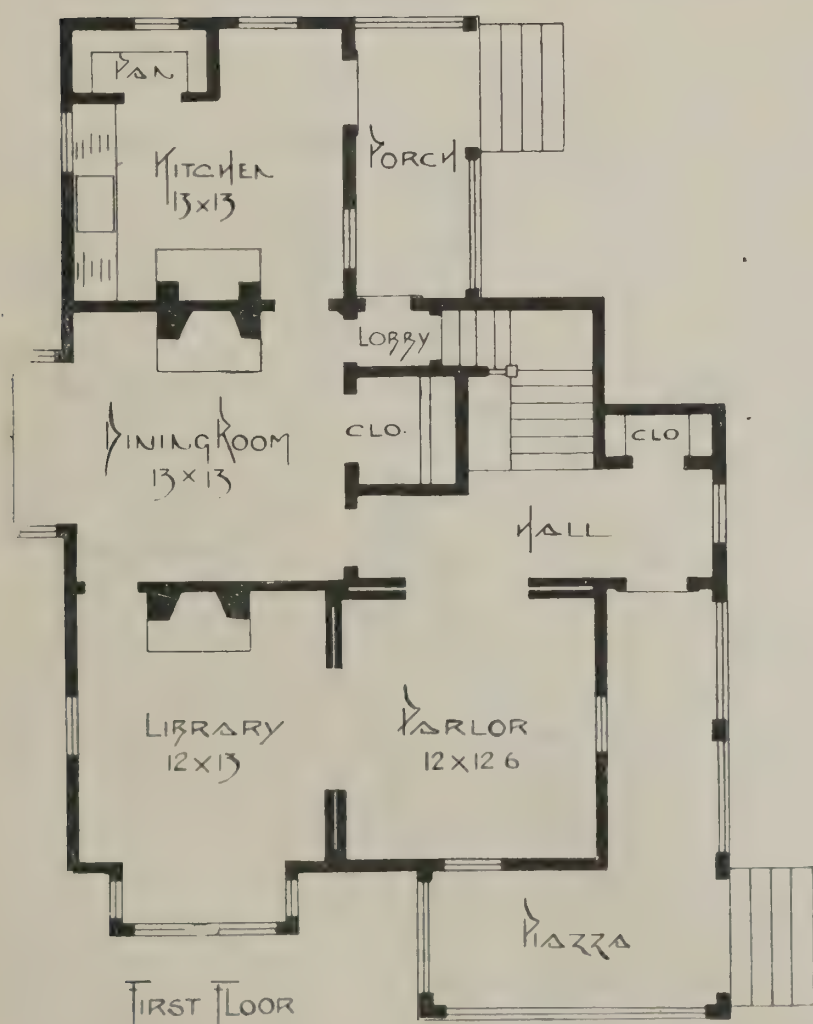
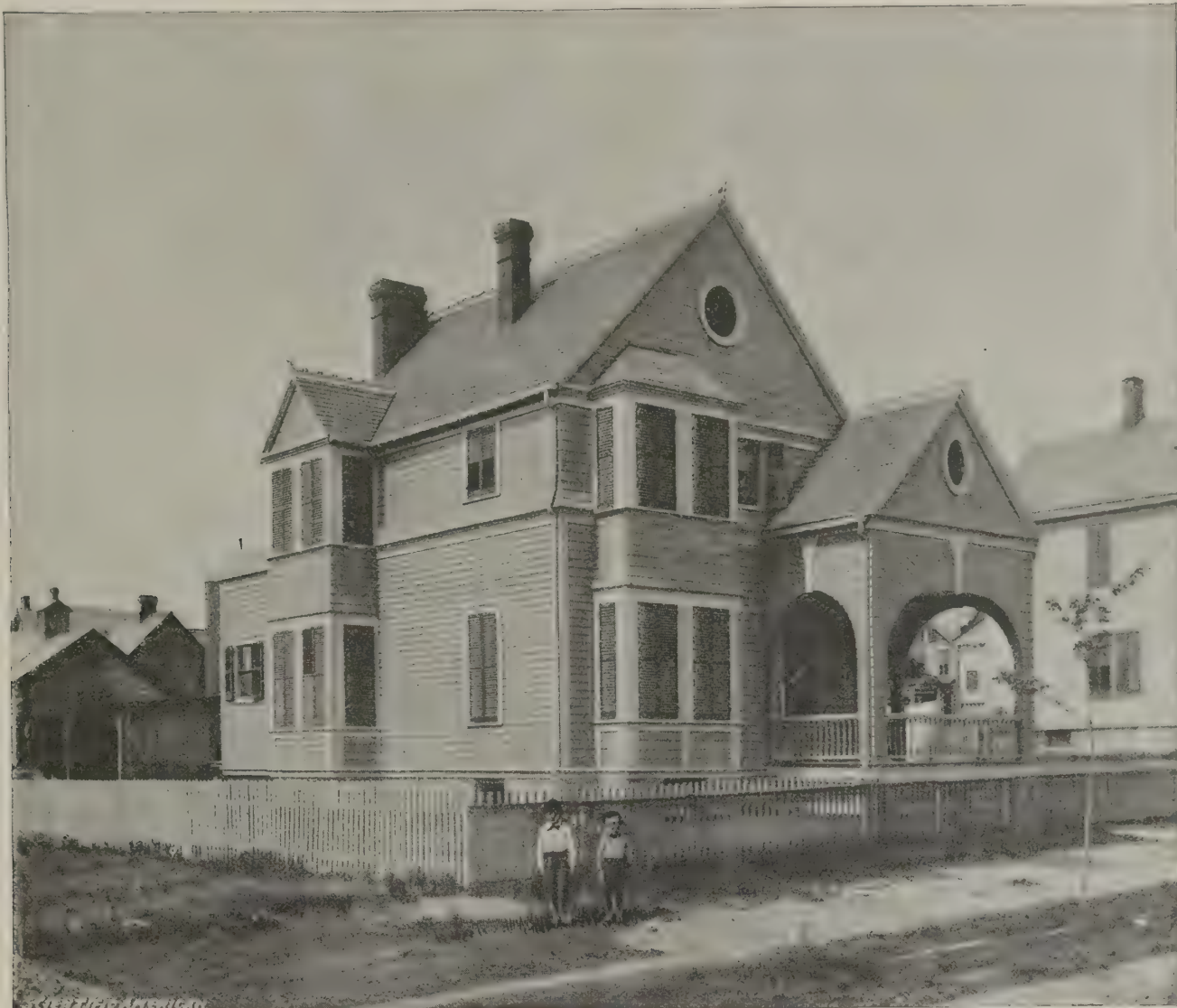
AN EASILY MADE PIAZZA.

There are many houses that have not the advantage of shade trees around them during the summer, when cool places are most eagerly welcomed. A piazza is perhaps next best in its shade to a wide-spreading oak, ash, maple, or elm. But piazzas are objected to by some, and with considerable reason, because they shut out the sunlight in winter, when it is particularly desirable. Moreover, the expense of building a permanent piazza, in the ordinary way, makes it an impossibility in many cases.

The illustration shows a way to secure the advantages of one without its disadvantages, and at so trifling an expense that it could be afforded by almost any one. A platform is made before the door of such length and width as may be desired. This can be a temporary structure, without a

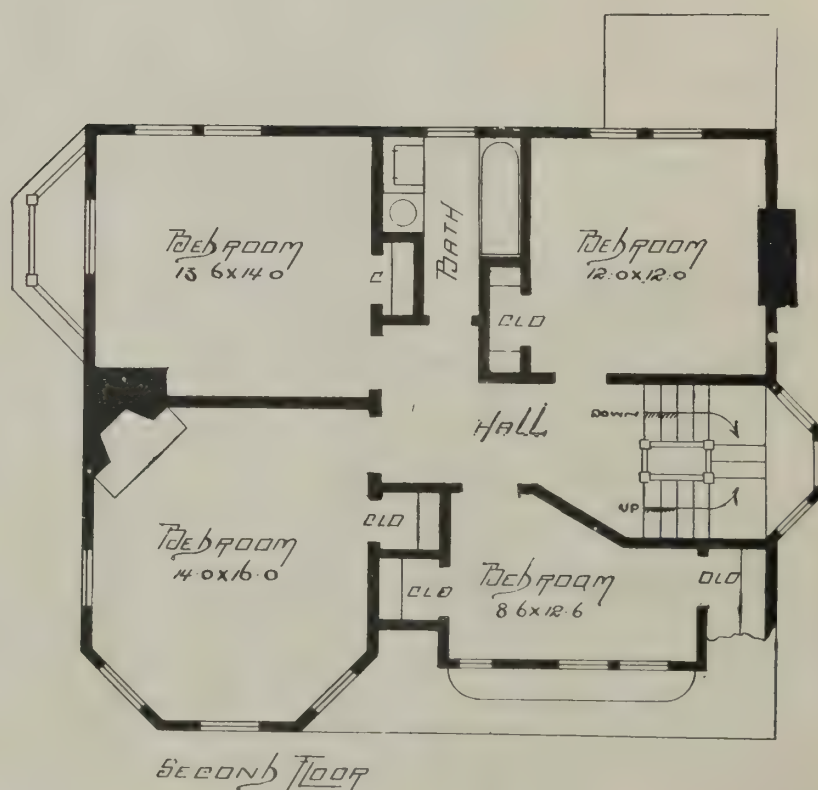
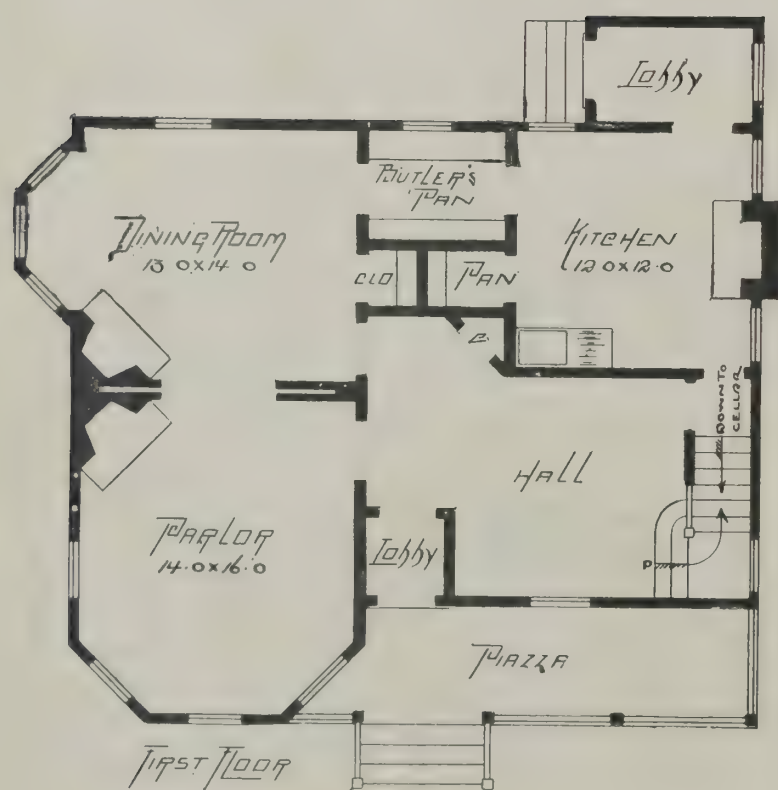


AN EASILY MADE PIAZZA.



[See page 30.]

A COTTAGE OF MODERATE COST.



[See page 81.]

A COTTAGE ON STATEN ISLAND.



[See page 31.]

NEW DWELLINGS ON SEVENTY-SEVENTH STREET, NEW YORK CITY.

THE SAINT JEROME CHAPEL.

It was not more than a few months ago that the public, which daily visits the Hotel des Invalides, was passing with indifference before the Saint Jerome chapel. The last wishes of Prince Napoleon, who expressed the desire to be interred in this chapel, have called attention anew to it, and started a sort of pilgrimage toward a completely forgotten corner of the hotel.

Of the four chapels that surround the tomb of the emperor, the Saint Jerome chapel is the one situated to the left as one enters through the large door on Place Vauban.

The three exits are closed by iron gratings, beyond which the public cannot pass, and each of these is just opposite one of the three crypts. In the central one of these there is a white marble altar, upon which lies a small bronze box, the pious use of which is shown by the following inscription:

Herein is inclosed the heart of Frederique Catherine Sophie Dorothee, Princess of Wurtemberg, wife of Jerome Napoleon, King of Westphalia, died November 28, 1835.

In the one to the left, a sarcophagus of black and

interior throughout is trimmed with white pine, finished natural with hard oil. The staircase in hall is provided with newel posts, balusters, and rail turned out of ash. Kitchen and pantry are wainscoted with narrow beaded stuff and fitted up replete. Storage in attic. Cemented cellar contains laundry and furnace. Cost \$1,500 complete. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

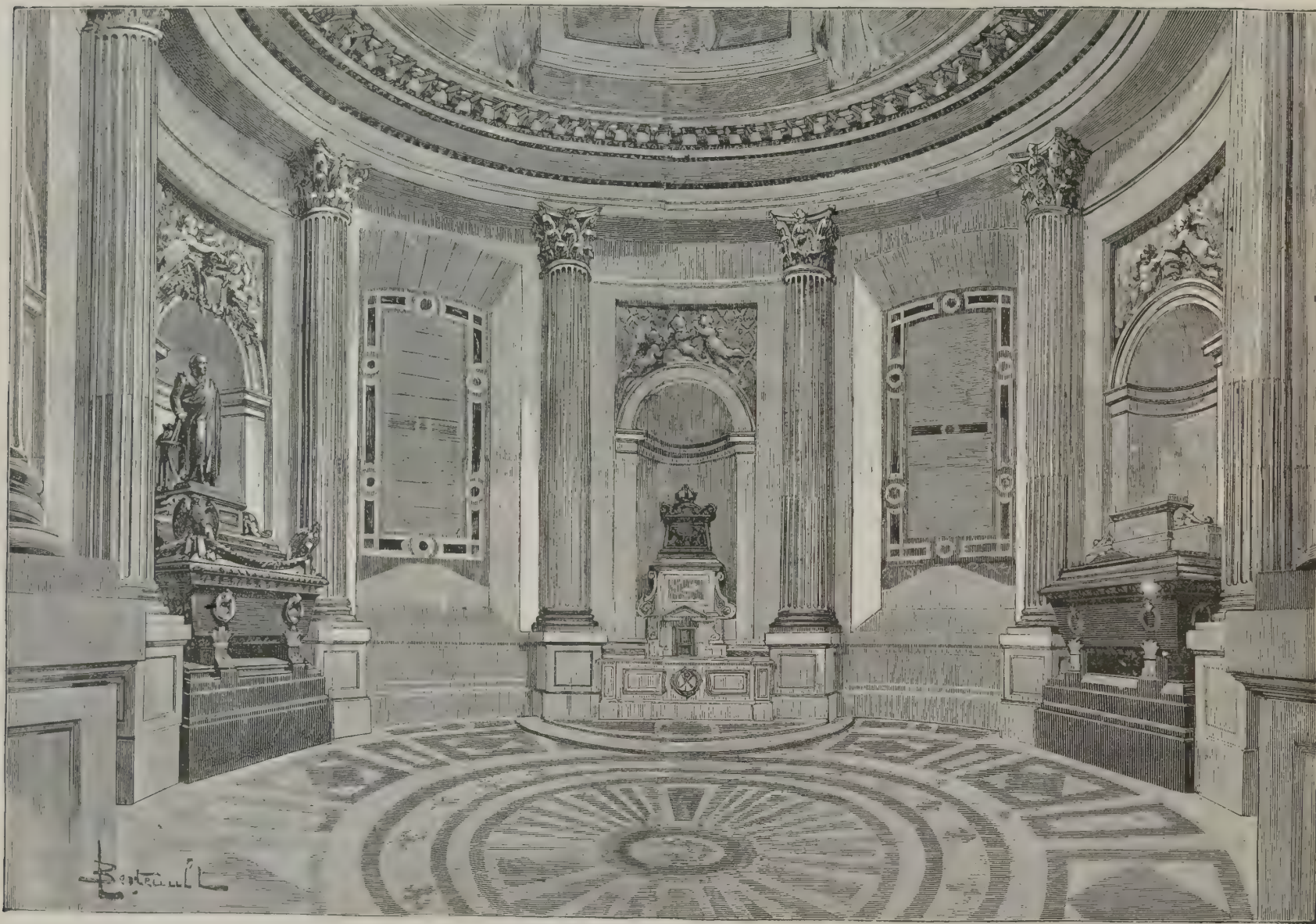
ST. JOHN'S M. E. CHURCH, NEW ROCHELLE.

The engraving on page 25 illustrates St. John's M. E. church, recently erected at New Rochelle, N. Y. The design is of the Romanesque style of architecture and the interior arrangement is after the Akron combination plan. This church is built of stone called serpentine ashlar, from Chester County, Pa., of greenish color, harmonizing beautifully with the rock-faced Ohio sandstone which is used as trimmings. Vermont red slate and terra cotta cresting cover the roof. The edifice fronts on Main Street 72 ft., and extends parallel on Le Count Place 128 ft. There are three entrances at front and one on either side leading into Sunday school room, with other entrance to basement.

Count, building committee. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE OF MODERATE COST.

Our engraving on page 27 illustrates a cottage of low cost, erected for Mr. J. L. Tower, at Roseville, N. J. Dimensions: front, 32 ft.; side, 41 ft., not including bay windows or piazza. Height of ceilings: cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in. Underpinning built of paving stone laid in cement mortar. First story, clapboarded; second story and columns to piazza shingled; all painted colonial yellow, with white trimmings. Blinds painted bottle green. Roof shingled and painted red. The trim throughout the interior is of whitewood, finished natural. Hall contains an ornamental staircase, turned out of ash. Fireplaces, built of brick, have cherry mantels of artistic design. Parlor, library and hall are separated by double sliding doors. Kitchen and pantries are wainscoted and fitted up complete with range, sink, etc. Second floor contains four bed rooms, with large closets, den and bath room, the latter replete with tub, bowl and closet. Open attic for storage. Cemented



THE ST. JEROME CHAPEL, HOTEL DES INVALIDES, PARIS.

green Alpine marble holds the mortal remains of the King of Westphalia, and the funeral urn is surmounted by a bronze statue, under which is graven the name, Jerome Napoleon I. This monument was erected along about 1862, by the architect Charles Normand, who had already built for the prince the Pompeian house of Avenue Antin, and who was commissioned by him to decorate provisionally the crypt to the right, which he designed at that time should be his last resting place. But this second urn, which faithfully reproduces the model of that of the King of Westphalia (save the statue, the eagles, and the royal crown) is but a simple, rough model of painted wood, destined solely to show, upon the spot chosen, how important the monument would have been.

Sad irony on things here below! This unclassified Caesar had during his entire life but a hypothetical tomb, in which destiny has not permitted him to sleep his last sleep.—*L'Illustration*.

A \$1,500 COTTAGE.

Our engraving, page 24, presents a cottage of low cost, erected for Mr. Charles Owns, at New Dorp, Staten Island. Dimensions: Front 25'; side 32'. Height of ceilings: Cellar 7'; first story 9'; second 8'. Underpinning, brick. First story, clapboards. Second story, shingles, painted colonial yellow, with white trimmings. The plan is unique. It contains six large bed rooms and one small one, which can be utilized for a bath room. The

where the parlor, dining room and kitchen are located and fitted replete. The entrance under archway leads into a large corridor, from which the pastor's study opens; a few steps on either side lead to vestibules, from thence to church auditorium, or by stairs to gallery. Organ and choir loft are located over front entrance and are somewhat elevated above pulpit. The floor of the auditorium is on a slight incline, and the Sunday school room is extended on a line with it. The latter can be separated when necessary by large folding doors in three sections, sliding into pockets.

There are twelve class rooms at rear of school room, five on main floor and seven in the gallery. Pews and altar are of red birch, while all other woodwork is of poplar, dead finish. The church auditorium and gallery has a seating capacity of 700, and the Sunday school and class rooms 600, making a total of 1,300. Both auditoriums are lighted by large chandeliers with electric attachment. The windows are glazed effectively with stained glass. The walls are handsomely frescoed. It is ventilated by air ducts running from basement to roof. Heated by two large furnaces and one small hot water furnace. Cost as follows complete: lot 100×250 ft., \$10,000; building, \$47,000; organ, \$2,700; cushions and portieres, \$1,280; pulpit and table, \$100; gas fixtures, \$2,000; furniture, \$500; total, \$63,580. Messrs Weary & Kramer, of Akron, Ohio, were the architects. Mr. David Meyers, builder. Messrs. R. H. Mullineaux, A. Guest and C. O. Le

cellar, contains furnace. Cost, \$2,800 complete. Mr. Tower, the proprietor, was the architect and builder.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

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A COTTAGE ON STATEN ISLAND.

Our engraving, page 28, illustrates a very compact, convenient and attractive house recently completed for Mr. Vaughn, at New Dorp, Staten Island. The foundation is built of stone. The first story is clapboarded and painted ivory white; the second story is shingled and painted colonial yellow, with ivory white trimmings. Dimensions: Front 38 ft.; side 36 ft. 6 in. Height of ceilings: first story 9 ft. 6 in.; second story 9 ft. The trim throughout the interior is of white-wood; the parlor stained and finished in cherry, and the dining room in black walnut. The rest of the wood work is finished in the natural with hard oil. The hall, which is large, contains a very pretty staircase, with newels, posts, balusters, and rail all handsomely turned out of whitewood. The oriel bay window thrown out at second landing on staircase is glazed with stained glass. The parlor and dining room have open fireplaces, with tiled hearth and hard wood mantels. The floors are of hard wood. The butler's pantry has a dresser, drawers and shelves. The kitchen is wainscoted with narrow beaded whitewood to a height of six feet; it contains a range, sink, stove, pantry, etc. There are four rooms of good size and bath room on second floor; the bath room is wainscoted and is provided with tub, bowl and closet in the best possible manner. There are two rooms in attic. The house is heated by a furnace and is provided with electric bells, speaking tubes, gas, etc. There is a cemented cellar. The cost is \$4,950.

Our engraving was made direct from a photograph of the house taken specially for the SCIENTIFIC AMERICAN.

NEW DWELLINGS ON SEVENTY-SEVENTH STREET, NEW YORK CITY.

We illustrate on page 29 a very attractive block of five houses, erected for Mr. Bernard Levy, on West Seventy-seventh Street, New York City. Height of ceilings: Cellar, 7 ft.; basement, 9 ft.; first story, 12 ft.; second, 10 ft.; third, 9 ft. 6 in.; fourth, 9 ft. We give plans and description of the right hand house, shown in the engraving. Front wall built of Indiana limestone, other walls of brick. Cemented cellar under whole of building; contains two furnaces. Basement trimmed with ash; contains billiard room, kitchen, laundry, store room, refrigerator, and numerous pantries, closets, etc. Billiard room is provided with an open fireplace; kitchen and laundry each have ranges built in; dumb waiter runs to second floor; vestibule floor is tiled. The hall, parlor, and music room are trimmed with mahogany. Hall contains a grand staircase, with a massive newel elegantly carved; it also has a paneled wainscoting and a beveled plate mirror, six feet wide, running from floor to ceiling. Parlor and music room are separated by a "Moorish" arch, with screen handsomely carved. Back parlor finished in white mahogany. Fireplaces throughout have facings and hearths laid with tiles, and massive carved mantels to correspond with the trim of each room. Each mantel has a beveled plate mirror. Dining room, trimmed with ancient oak, is finished in "Old English" style, with ceiling beams, paneled wainscoting 7 ft. high, a large open fireplace, and buffet, all elegantly carved. Parquet floors on first story. Second floor trimmed with cherry. Bath room is paved and wainscoted with white English tiling, and is furnished with an enameled bath tub, sitz bath, bowl, and closet, all fitted up in the best possible manner. Third floor is trimmed with sycamore, and the fourth floor ash. Dressing rooms are provided with bowls and closets, with all doors glazed with plate glass mirrors. This house is double plumbed, and is furnished with electric bells, speaking tubes, burglar alarm, and all the conveniences. Mr. Bernard Levy, builder.

Our plate was made direct from a photograph of the houses specially taken for the SCIENTIFIC AMERICAN.

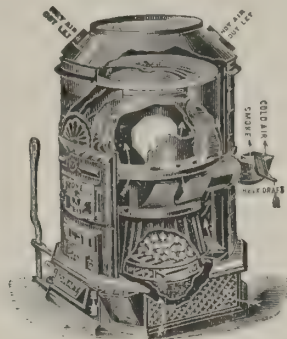
A Millionaire's Residence.

Mr. C. P. Huntington is building a residence at Fifth Av. and 57th St., N. Y., which will cost him in the neighborhood of \$1,500,000, and he has frequently asserted that his chief aim in life was to get a comfortable home and enjoy the remainder of his life with his children. Some idea of his notion of a "comfortable home" may be gathered from a remark he made not long ago. "I am building a house," said he, "that may not be as pretentious as some others, but it will have all the comforts and conveniences that modern society requires. In my home I shall enjoy not only privacy and domesticity, but every convenience that the most elaborate hotel can afford. My carriage will land my friends in the house, and not in the street; my kitchen will perform its functions at an

altitude where no cooking odors can reach or offend the occupants of the house; and seated in my study I shall be able to communicate with any part of the outside world."

AN IMPROVED HOT-AIR FURNACE.

In the furnace shown in the accompanying illustration the ash-pit is of ample capacity, and is heavy and durable. The grate is agitating and clinker-clearing, easily manipulated, and strongly made for hard service, while sufficiently open to readily pass through all fine ashes and admit air fully to the fire. The ash pit is also ash-freeing in shape and is heavy and ribbed,



THE "NOVELTY" FURNACE.

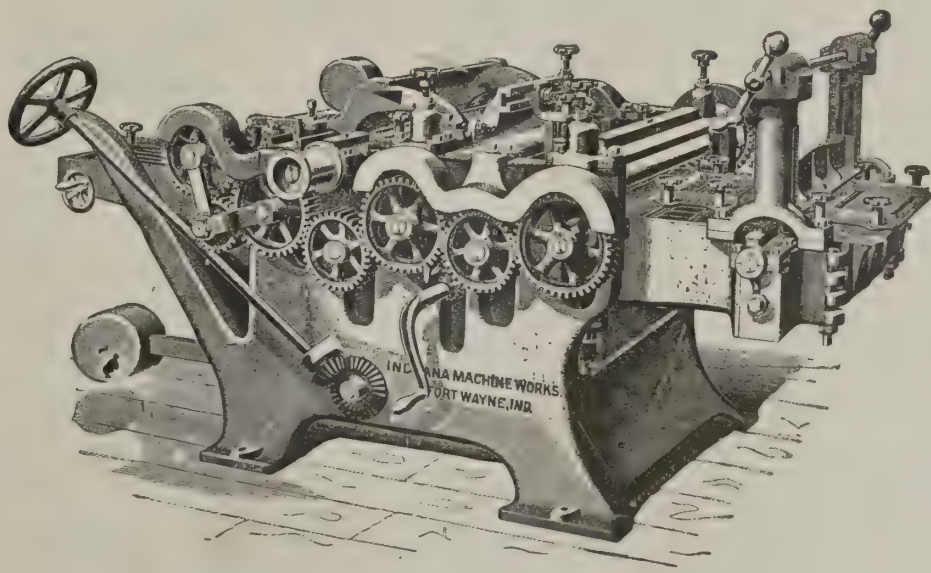
thus largely increasing the heating surface. The crab or radiator of this furnace gives an immense additional heating surface, supporting above contact with the coals three large drums of heavy steel, and combining with the flue strips to cause an indirect draught. The crab and steel drums are quickly raised to a high temperature and are perfectly self-cleaning, while a check-draught is provided by which the combustion may be nicely controlled. These excellent furnaces are made by the Abram Cox Stove Co., of Philadelphia, Pa., who are also manufacturers of stoves, ranges, etc., and a full line of hot air supplies. The company print an interesting "Furnace Book," which will be sent free to applicants.

Iron and Steel Roofing.

The Cambridge Roofing Co., of Cambridge, O., has built a branch factory at Chattanooga, Tenn., which is now in full operation. The company notify their Southern trade that goods will be shipped promptly from their Chattanooga factory and thereby be received quicker than if shipped from the North. The company manufacture all kinds of corrugated and V crimped and other common styles of iron roofing, but desire to call special attention to Crowl's patent standing seam steel roofing, which is their specialty, and their patent eaves trough and conductor and roofing paints. An illustrated catalogue and prices will be sent free to applicants.

IMPROVED WOOD WORKING MACHINERY.

The accompanying illustration represents an improved double surfacer, manufactured by the Indiana Machine Works, of Fort Wayne, Ind. It planes both



A DOUBLE CLIPPER PLANER, MATCHER, AND MOULDER.

sides and matches all in one operation, planing 25 inches wide and 7 inches thick, and matching 12½ inches wide. It weighs 5,300 pounds, and was designed to meet the requirements of those demanding a machine capable of performing many duties, and with such adjustments as would permit of a speedy manipulation. The frame is cast in one heavy and massive piece. The table is cast in a similar manner, is very long, and provided with a heavy platen placed immediately under the top cylinder. The top cylinder is made of a crucible steel forging, has large journals, is driven by two belts, is slotted on two sides, tapped on the other sides, and as the machine is provided with adjustable pressure bars, cutters of almost any de-

scription may be used at any desired point, projecting any distance beyond lip of cutter head not exceeding 1½ inches, without removing any of the fixtures just mentioned. The lower head is made of same material and same manner as the upper, except that it is driven by one belt. The end of table is very substantial and swings on a heavy hinge, furnishing free access to the head. The six feed rolls are very large, have substantial bearings, are all powerfully geared, the gears being cut from the solid, and controllable instantly by a belt tightener. There are two speeds of feed, namely, 35 and 65 lineal feet per minute. The matcher spindles are of large diameter, made of refined steel, and revolve in long self-oiling bearings, with provisions to compensate for wear. Three winged gun metal heads with milled bits are furnished, and if desired will substitute them with Shimer heads. Said of heads are adjustable separately, or together, from either front end of table or side of machine, the guide fence moving with the head on same side of machine. With each machine is furnished a complete countershaft, two sets of knives for upper head, one set for lower head, one set of solid milled matcher bits, one set of beading bits, one set of patent siding cutters, and necessary wrenches. Tight and loose pulleys on countershaft are 12 inches in diameter with 6 inch face, and should make 900 revolutions per minute.

Architect of the Woman's Building.

Miss Hayden, who graduated in the regular architectural course at the Institute of Technology, Boston, last year, and whose thesis is published in this number, has recently won the competition for the Woman's Building at the Columbian Exhibition, Chicago. It is to be the proud boast of the manager of the woman's department that everything relating to that department shall be the actual work of women, and with this idea in view they instituted a competition for the design of the building, providing the competitors with a sketch plan and the general disposition of the rooms. Two elevations in line only were required at one sixteenth of an inch to the foot.

Of the drawings submitted, Miss Hayden's were pronounced the best. She was awarded the first prize of \$1,000, and has gone to Chicago to undertake the erection of the building. Miss Lois Howe, a graduate of last year's special course, won the second prize of \$500. The success of these young ladies proves the efficacy of training, and their enthusiasm for their profession, for both are most determined in their desire to be architects in every sense of the word. They can be heartily congratulated on their attainments.—*Tech. Arch. Review.*

The Plain Design is the Best.

In house building, only a high degree of artistic talent, which costs money, and must have plenty of money at its command, can be safely employed in elaborate ornamentation. On this point the Philadelphia *Real Estate Record* quotes from an exchange the following sound advice:

"One of the chief reasons for the failure of cheap houses to look well is the fact that they are overloaded with ornament. If those who wish to build cheaply would be content to build plainly, the results would be more satisfactory to the eye. The same fault is noticed in cheap furniture. It is always disfigured with fancy turns and machine carving, while to find a piece of plain, substantial finish, one must look at the high priced goods. Too many men, only able to build a cottage, load it with weak imitations of the handsome decorations of the palace, and the result is thoroughly inharmonious. In the cheap house let plainness of construction reign from foundation to gable. Let the ornamentation be, not in the woodwork, but in the painting. Then the effect may be whatever desired, and may be changed at the pleasure of the owner.

THE rust on the inside of a shot gun can be removed by rubbing with a perforated cork glued on a stick of wood. The cork is to be trimmed with a sharp knife to fit tightly in the barrel. Then with oil and ground pumice stone, or tripoli, polish the inside of the barrel until it is free from rust.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.

Inside Sliding Blinds.

Inside blinds which are neat and durable are made by Mr. George Poppert, of Milwaukee, Wis., in which counterbalancing weights are used, the same as ordinarily used for sash. These weights take the place of the springs back of the blindways, allowing each section of blind to work independent of the other. A child can move the blind to any desired position, as a tip with the finger will set the blind moving. The back of the blindway is grooved to allow for the travel of the weight, and the weights are entirely inclosed between the blindway and the face of the frame. This blindway can be attached to all windows, old or new. Those desiring blinds of this character should send for a catalogue.

AN IMPROVED TENONING MACHINE.

The machine shown in the illustration will cut a tenon varying from a quarter of an inch to six and a half inches in length, and by running over the cutters a second time as much as nine inches may be taken off. It is adapted for furniture and cabinet factories, planing and saw mills, carriage and wagon shops, cooperage and agricultural implement works, etc. The table is light yet strong, and can be quickly and accurately adjusted, and the swinging frame supporting its outer end is made to bear on both sides and not in the middle, so that there is no liability of its weakening and getting out of line. The frames carrying cutter heads and mandrels are adjusted vertically, either together or separately, by a single screw. The mandrels revolve in long self-oiling bearings with pulley in center, and the cutter heads are furnished with adjustable spur saws, having the knives set at an angle to give a smooth drawing cut.

This machine is manufactured by the Cordesman Machine Co., of Cincinnati, Ohio.

The Cudell Trap.

This sewer gas and back water trap is based on the S form, with a sinking ball valve, and is designed to form a perfect seal with or without water. The trap is made of lead, except the dome and cover, which are of hard metal, and the ball is of non-corroding metal, made perfectly smooth, so that it will not collect filth. The screw thread of the cover is protected from the action of the water, and the cover is readily removed to reach the inside. This trap is manufactured by F. E. Cudell, 204 Superior Street, Cleveland, Ohio. A descriptive price list, showing different forms of application, will be sent to those asking for it.

THE BERGER MANUFACTURING COMPANY, of Canton, Ohio, in the latest issue of their handsome catalogue, show an extensive assortment of goods in which architects, builders and contractors are interested, among which are some new varieties of cornices, metallic shingles, patent ceilings, etc. Special attention is called to the Berger eave trough, in one continuous piece of metal without solder, a perfect wedge socket being made at one end into which the end of the succeeding trough is pushed when putting the sections together, the bead interlocking and forming a strong water-proof joint. The company have an enlarged factory with improved machinery, giving them great advantages in the production of sheet metal goods. A handsomely colored sheet in the catalogue affords a good illustration of how gilding and different colors may be combined to increase the effect obtained in the use of their paneled and enameled sheet metal ceilings.

Lightning Rods.

Messrs. J. D. West & Co., of New York City, manufacturers of a style of lightning rods which has a wide reputation, recently received their second order from the chief electrician of the French cable company for lightning rods to protect the building of the company at Cape Cod. It is also said that Sir William Thomson has recommended this system. Further commendation would seem to be superfluous.

Properly Anchoring Beams in Walls.

When solid beams or heavy timbers are used in a building, they should not be painted or incased in air proof material until they have thoroughly dried out. Beams are frequently sealed so tightly into the wall that dry rot takes place without a suspicion of anything wrong until a slight additional load causes them to give way. Timber exposed to air does not rot. Therefore it is important to arrange unseasoned timber so that air can circulate around it, especially the ends that rest upon the walls.

The Goetz-Mitchell anchor boxes (see adv. on page xii.) prevent dry rot on account of the air space around the ends of the timbers. The boxes at the same time act as a very secure anchor, because the tie is at the bottom, and for this reason the greater the weight the better the tie is holding. In case of fire a falling beam frees its own anchorage, and has no tendency to tear the walls down. The box also forms a good base plate for joists and beams. This method is indorsed by the National Fire Engineers, the National Underwriters, and many insurance companies. These companies have adopted a rule to insure such buildings as use these devices at a lower rate. They can easily afford to do this, for a standing brick wall will prevent the spread of fire better than any other agent. Among buildings in which this system of anchoring beams is used are the State University at Columbus, O., the

hereafter erected for mercantile or for manufacturing purposes should not exceed six thousand square feet, without special permission, based upon unusual and satisfactory precautions.

6. That every building to be erected, which shall be three stories high or more, except dwelling houses for one family, and which shall cover an area of more than twenty-five hundred square feet, should be provided with incombustible stair cases, inclosed in brick walls, at the rate of one such staircase for every twenty-five hundred square feet in area of ground covered.

7. That wooden buildings, erected within eighteen inches of the line between the lot on which they stand and the adjoining property, should have the walls next to the adjoining property of brick, or when built within three feet of each other, should have the walls next to each other built of brick.

8. That the owner of an estate in which a fire originates should be responsible for damage caused by the spread of the fire beyond his own estate, if it should be proved that in his building the foregoing provisions were not complied with. A certificate from the inspector of buildings shall be considered sufficient evidence of such compliance, if the building shall not have been altered since the certificate was issued.

Windmills to Supply Water for Houses, Etc.

The sale of the Corcoran windmill has greatly increased during the past few years. The connecting of a system of water supply for country residences with these inexpensive and tireless motors appeals very strongly to the consideration of those interested in such matters, and many advocates of its usefulness are found among the well known people residing in suburban places. It is probably the only device of the kind which, employed by the older generation, has been adopted by their descendants without question, and continues to give satisfaction, having been improved in every way to keep pace with the present demands.

Graphite Grease.

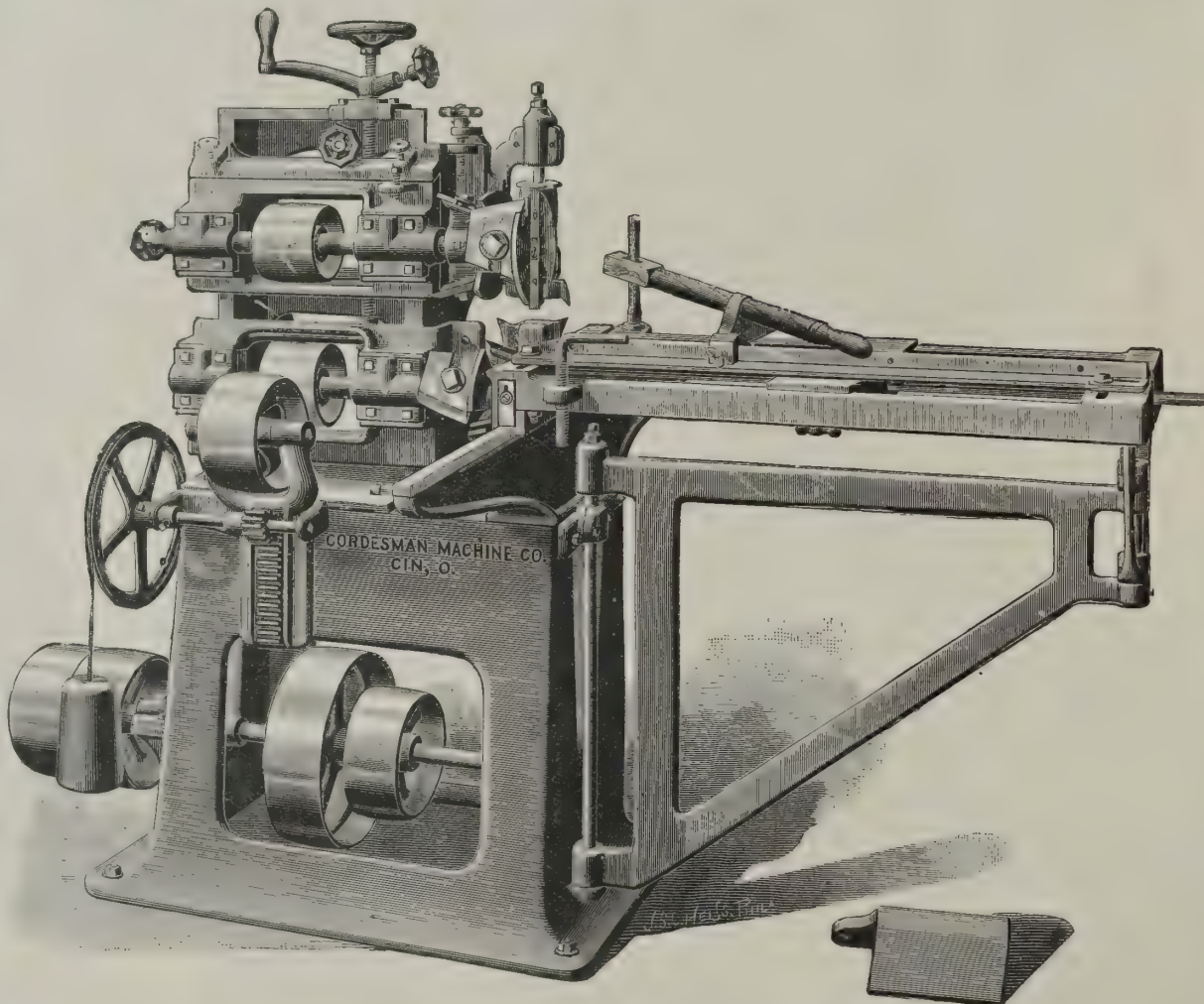
A large manufacturer of steam, hydraulic, and hand elevators in Baltimore writes that they have been using Dixon's graphite grease on their elevators for about two years, and find it superior to any lubricant they have ever used. They also use it on their wire cables to prevent rust, and for the guides of elevators. It is made

by the Joseph Dixon Crucible Co., of Jersey City, N. J.

THE GARRY IRON AND STEEL ROOFING CO., of Cleveland, Ohio, write us that they have had an excellent trade this season. They have also had considerable foreign trade, having exported their goods largely to Mexico and elsewhere, one order for their Continental Metallic Shingle coming from St. Petersburg, Russia. The firm make all kinds of siding and ceiling, iron shutters, pipe and guttering, metallic paints and cements, etc., of which they send a price list free to applicants.

THE HARTMAN SLIDING BLIND CO., of Wooster, Ohio, is now the style of the firm conducting the sliding blind business formerly carried on by Messrs. Hartman & Durstine, of the same place. This change was made July 1.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



A TENONING MACHINE FOR HEAVY CABINET WORK, ETC.

electric power building, at Louisville; Montgomery Ward & Co. and Ritchie & Co., business blocks at Chicago; the Shadbolt and the Bliss Machine Co. factories, at Brooklyn, with numerous others in Philadelphia, New York, New Haven, Providence, Springfield, Boston, Des Moines, Baltimore, Indianapolis, St. Louis, etc. The Goetz-Mitchell Company home office is at 78 State Street, New Albany, Ind.

A Proposed Universal Building Law.

The committee of delegates from the American Institute of Architects, the National Association of Master Builders, the National Association of Building Inspectors, the National Board of Underwriters, and the National Association of Fire Engineers recommended the following as the essential points for a building law:

1. That all buildings over seventy feet in height be constructed throughout of incombustible materials, protected in the most approved manner for resisting fire.
2. That interior structural ironwork in all buildings be covered and protected by fireproof material.
3. That all buildings over fifty feet in height be furnished with permanent standpipes and ladders for the assistance of the fire department.
4. That the height of buildings to be erected should not be more than two and one-half times the width of the principal street on which they are situated, and that no building, or portion of a building, except church spires, should be more than one hundred and twenty-five feet high, except under a special permit.
5. That the open floor space, not divided by walls of brick or other incombustible material, in all buildings

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ARCHITECTS

AND BUILDERS

EDITION.

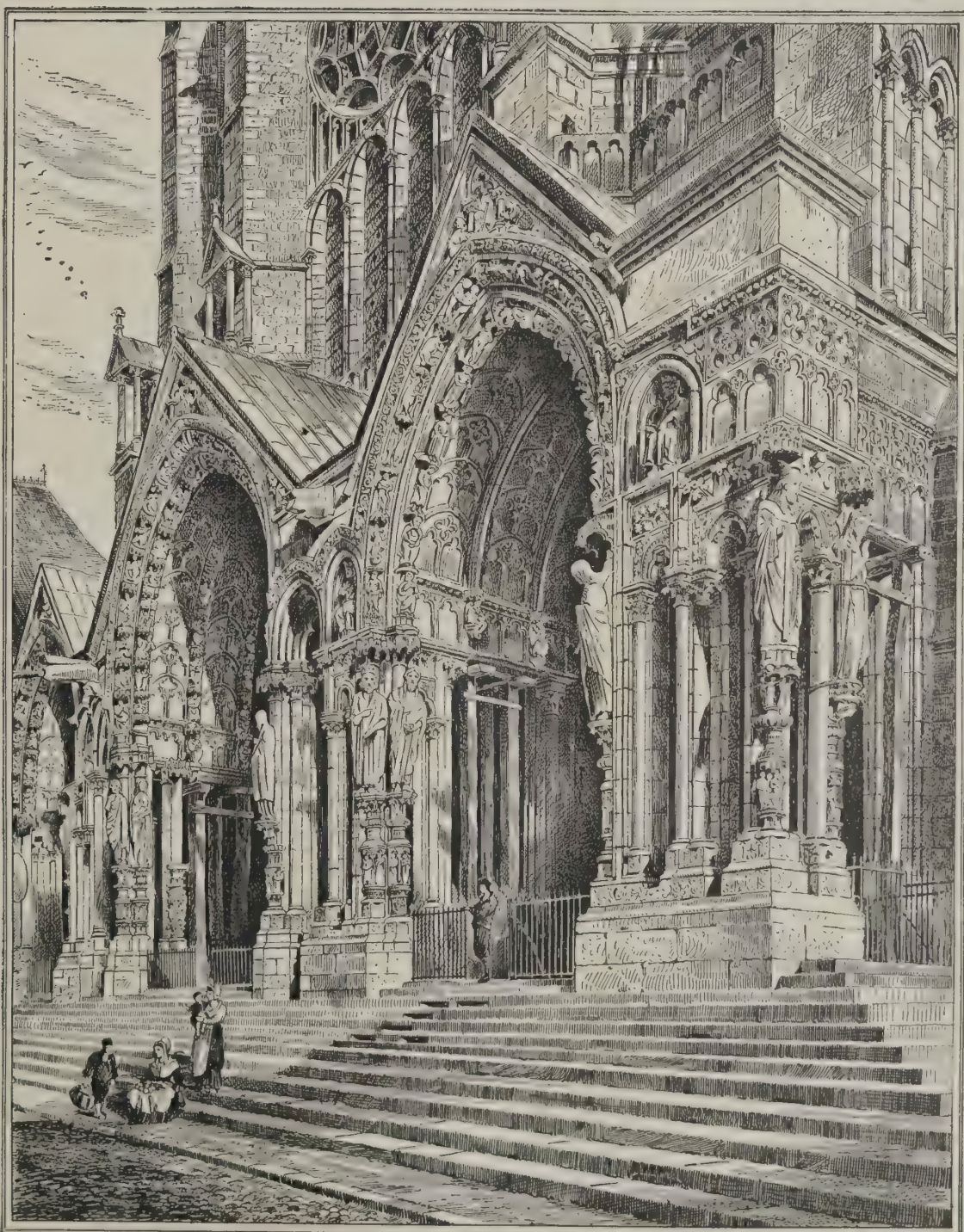
Vol. XII.

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NEW YORK, SEPTEMBER, 1891.

Single Copies, 25 Cents.

No. 3.



THE NORTH PORCH CHARTRES CATHEDRAL

DRAWN BY MAURICE B ADAMS FRIBA.

[See page 34]

Scientific American.

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A. E. BEACH.

NEW YORK, SEPTEMBER, 1891.

THE

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ARCHITECTS AND BUILDERS EDITION.

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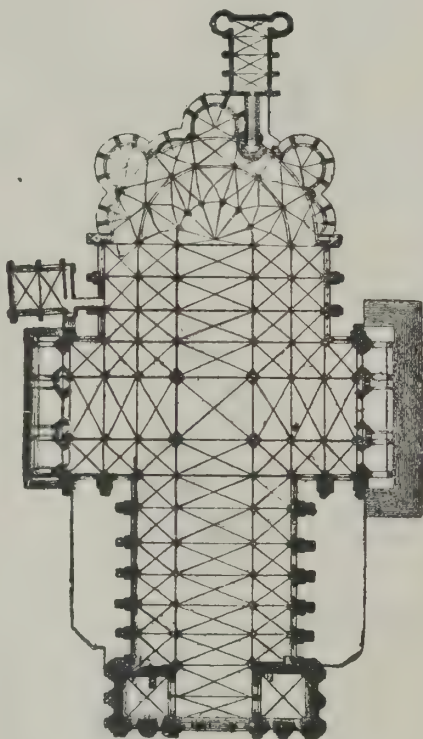
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THE NORTH PORCH, CHARTRES CATHEDRAL.

There is nothing finer in its way throughout the whole of France than the well known and magnificent North Portal of Chartres Cathedral. The exquisite character of the detail and beauty of the sculpture are as famous as the grand proportions of the entire composition, which rivals many a celebrated western front for scale and nobility of conception. We give herewith a plan of the cathedral, which shows the importance of the transept entrances. The Portail Royal is located at the west front. In Nesfield's "Specimens of Mediaeval Architecture" some sheets of measured details of this work will be found. We give a view of the North Portal, taken when the struts were up to shore the building, as the fabric was more or less unsafe. Probably these timbers have since been removed, and the portals "restored." The dedication of the cathedral took place in 1260, and these porches were not finished till after that date. Intermittently, thirty years are said to have been occupied in their erection, and the uniform style of the work is remarkable, considering this lapse of time which had taken place since their commencement.

The several parts present a capital study of ornamentation, and it may be noted that toward the completion of the work a tendency was, it seems, developed in the direction of more naturalistic forms in the foliage. The arches are highly ornate, and the western one, to the front of our view herewith, has the Signs of the Zodiac in the outer order, and in the inner order occur in niches twelve statues representing the industries of each month of the calendar. Winter



and Summer are also included among the statues outside. As an instance of the minute care taken with the detail, it may be remarked that the former of these two figures is supported on a cap enriched with flames, and a fish is being cooked therein, while "Hiemps" is hooded and wrapped in a cloak to withstand the storm. Janus, representing January, has two heads, one old as the past year, and one youthful to signify the new year. February figures as an old fellow seated at a fire, and March a man pruning vines. Pisees is inserted in the south door of the west front, and is here left out. April is crowned with flowers. May is a man going hawking. June mows a meadow, and so on each month through harvest, till we reach November, who is killing a pig, the boar's head being introduced with the December figures.

The Massacre of the Innocents and Adoration of the Magi come into the treatments of the caps below. On the pedestals supporting the great statues we have representations of the arts and sciences, with historical figures, as Adam, Abel, Cain, Jubal, Tubal Cain, etc. "La Monographie de la Cathédrale de Chartres" furnishes some excellent drawings of much of this sculpture. The work, published in Paris, is worth a reference. Abbé Bulteau, who wrote a book on the iconography of this church, speaks of the crowned figure among the great statues here seen as St. Ferdinand, King of Castile and Leon, one of the founders of the cathedral. The other statues are variously named the Queen of Sheba, Solomon, Samson, and the rest. Above, within arched niches, are seated figures of kings. There are, in fact, no less than over four thousand figures enriching the cathedral, of all sizes, and many of them were once covered with gilding and color, having parts accentuated by dark glazed tints introduced in the folds of the drapery. They are carved out of Berebere stone, of which the church itself is built.—The Building News.

A COTTAGE IN THE COLONIAL STYLE.

We present herewith in colors a quaint and tasty piece of rural architecture, quite roomy and comfortable, recently erected for the Rochelle Park Co., at New Rochelle, N. Y. This design has many bits of detail that are of interest, including the wide piazza at front and extending along the side of house, the ornamental chimneys, overhanging roof, balconies, bay windows, etc. Dimensions: Front, 32'; side 46', not including piazza. Height of ceilings: Cellar, 7'; first story, 9'; second, 8' 6"; third, 8'. Underpinning of field stone, laid at random. Exterior is covered with shingles, weather finish, with trimmings painted white. The plan is excellent. It combines both spacious and convenient apartments. Hall is trimmed with natural cherry and contains an artistic staircase. This staircase is lighted effectively with stained glass windows. Parlor is trimmed with cherry and dining room with oak. Each has open fireplace furnished with tiled hearth and hard wood mantel. Kitchen and its apartments are trimmed and wainscoted with North Carolina pine, finished natural and fitted up replete. Second floor contains four bedrooms, large closets and bathroom, all trimmed with whitewood finished natural. Bathroom is wainscoted and fitted up in the best possible manner. Floors throughout are of hard wood laid in narrow widths. There are two rooms on third floor, besides storage. Cemented cellar contains furnace and other apartments. Cost \$5,600 complete. Mr. G. W. Thompson, architect, same place.

Our plate was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A SUBURBAN DWELLING.

One of our plates in colors this month illustrates a dwelling erected for B. Binninger, Esq., at Arlington, New Jersey. The exterior is very picturesque, with its pleasant piazza, tower and chimney, the latter being an architectural feature in itself. Underpinning is built up with rock-faced bluestone laid at random. The superstructure above is of wood, covered with clapboarding and shingles, and painted light olive green, with bottle green trimmings. Roof covered with octagonal cut slates. Dimensions: Front, 35 ft.; side, 40 ft., not including front porch. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The plan is excellent. The interior throughout is trimmed with white pine finished natural. The hall is spacious and is provided with a hard wood floor, coat closet and bowl, and an ornamental staircase, the posts of which extend to ceiling. The space between these posts is filled in with spindle work. Parlor and dining room are connected by double sliding doors, and each has an open fireplace, furnished with a tiled hearth and facing, and antique oak mantel, with beveled plate mirror, etc. Kitchen and pantries are wainscoted, and all are fitted up in the best possible manner. Second floor contains four spacious bedrooms, large closets and bath room; the latter wainscoted and furnished with tub, bowl and closet. Three bedrooms and storeroom on third floor. Cemented cellar contains laundry, furnace, and brick ash pits connecting with all fireplaces. Cost, \$4,750 complete. Mr. J. B. Warren, architect, same place. Our plate was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

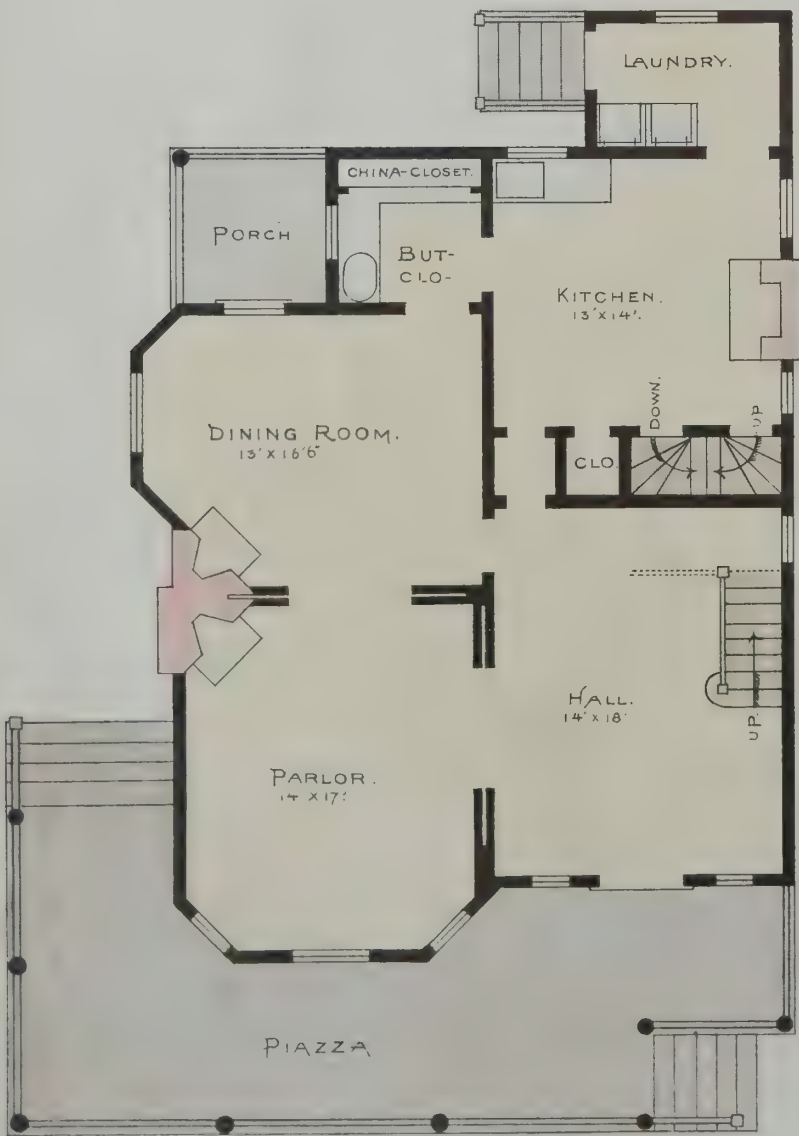
A ONE THOUSAND DOLLAR COTTAGE.

We publish on page 36 two floor plans and photographic view of Mr. Tillotson's cottage, taken specially for the SCIENTIFIC AMERICAN. Same is situated at Ridgeland, on the west side of Chicago, and was built by W. I. Tillotson, architect. The building is of frame construction, covered with clapboards; there is no basement, and it is built upon cedar posts 9 in. diameter. The main entrance is from a covered porch, 2 ft. 11 in. above the grade line, and on the left of the hall is a den, 7 ft. 6 in. x 10 ft., which is entered through sliding doors. The parlor opens off the opposite side of the hall, is 14 ft. x 14 ft. 6 in., is heated by an angle fireplace, and connects with the dining room by a portiere. The dining room is situated at the rear of the parlor, measures 14 ft. x 14 ft., and is lighted by a mulioned window. It connects directly with the parlor, hall, and kitchen, and is heated by an angle fireplace. The kitchen measures 8 ft. x 12 ft., and is fitted with range, etc., and opens on to the rear porch. Has also entrance to hall. There are four chambers on the second floor, with closets attached, and a small balcony projects over front porch. The whole makes a very comfortable residence, and is estimated to cost \$1,000.

THE utilization of the street cars for the package express business, inaugurated in St. Louis, has proved so successful that, according to the *Street Railway Review*, additional cars will be put on. There are thousands of dollars of good dividends going to waste in every good sized city in the country, which ought to be secured to the treasury of the street railways. In connection with the transportation of parcels, other conveniences, such as the collection and distribution of letters, may be added with no extra expense and to the very great convenience of the public.



A COTTAGE IN THE COLONIAL STYLE.



First Floor



Second Floor



A SUBURBAN DWELLING.





CLIMBING AND OTHER ROSES.

How to have roses in bloom for as long a portion of the year as possible, and in all sorts of positions, is a matter worth serious consideration. There are two classes of rose growers, besides those who grow for sale; the one has for his principal object the production of blooms for exhibition, while the other grows them for decoration and the production of flowers for cutting. Now there are so many families of the rose, and so many varieties belonging to each family, that suitable roses may be found for almost all kinds of uses and positions in a garden where flowers of any kind can be used. The following are some of the uses to and positions in which rose plants may be put in a garden, viz., beds, borders, shrubberies, poles and pillars, arches, arbors, walls (north, south, east, or west), hedges, screens, etc. Before entering into any particulars, however, as to the different kinds of roses adapted to the various purposes just mentioned, I should like to make a few remarks on the more or less important subject of soil. I say "more or less" here, because if only the commoner kinds of roses be grown, the kind of soil is a matter of small importance. The old summer blooming climbing roses belonging to the Boursault, Ayreshire, and Sempervirens classes, as well as most of the varieties belonging to the Gallica, Hybrid China, Hybrid Bourbon, Austrian Brier, and many other summer blooming families, are not at all particular in the matter of soil, being able to thrive and grow in that of almost any description, although, of course, they thrive best where the soil is good. Where the best kinds of continuous blooming roses are required to thrive and repay the cultivator, there the soil must either be naturally good or adapted to the purpose by artificial means.

For poles, pillars, arches, arbors, walls, sides of houses, and high buildings, etc., only those roses are suitable which have more or less of what is called a climbing habit of growth. Roses which make long rambling growths, whose shoots are unable to stand up without support of some kind, are the kinds which do duty as climbers. Before determining on the kind

of climber to plant, however, the height the plants are required to attain must be considered. Most of the vigorous hybrid perpetuals and teas will reach a height of from 8 feet to 15 feet if the soil be good, and on warm sheltered walls 4 feet or 5 feet more. The extra strong growers of the same classes, with the ex-Noisettes and hybrid Noisettes, will cover well up to 15 feet or 20 feet or more. The Banksian roses are cellent as climbers, but should only be planted against walls in rather sheltered positions; they are only sum-

the way of height. They completely cover themselves with flowers during the blooming period if rightly treated, and all the treatment they require, if in good soil, consists in tying them to their supports, pruning out weak and exhausted wood, and encouraging to the utmost such vigorous young shoots as may be required. No growths need be shortened except to keep them within the bounds allotted to the plant and to take off unripened ends. Climbing roses away from walls should not be planted in very exposed positions, or, as a rule, they will fail to gratify the cultivator.

Climbing roses may be used to screen unsightly buildings and other objects by training them to galvanized wire or other fences or supports, and, except when the leaves are off, they answer this purpose admirably. All the above methods of growing roses not only produce good decorative effects, but give supplies of flowers for cutting. — *The Garden.*



CLIMBING ROSES OVER A DOORWAY.

mer bloomers. The white and yellow will grow as high as 30 feet in good soil, but the large white will run much higher. This kind is evergreen, except in very sharp winters, which is a great recommendation, but it is not so free flowering as the two first named varieties. The old blush and crimson China roses will also run up the face of a wall freely to a height of 30 feet, and, as before stated, for continuous blooming qualities they are unsurpassed by the varieties of any other family of roses; indeed, they are frequently at their best when inexorable frost sternly interposes and checks them; in spite of this, however, it is not unusual to find a few buds still unfolding at Christmas time. The old fashioned summer blooming roses before alluded to are capable of almost anything in

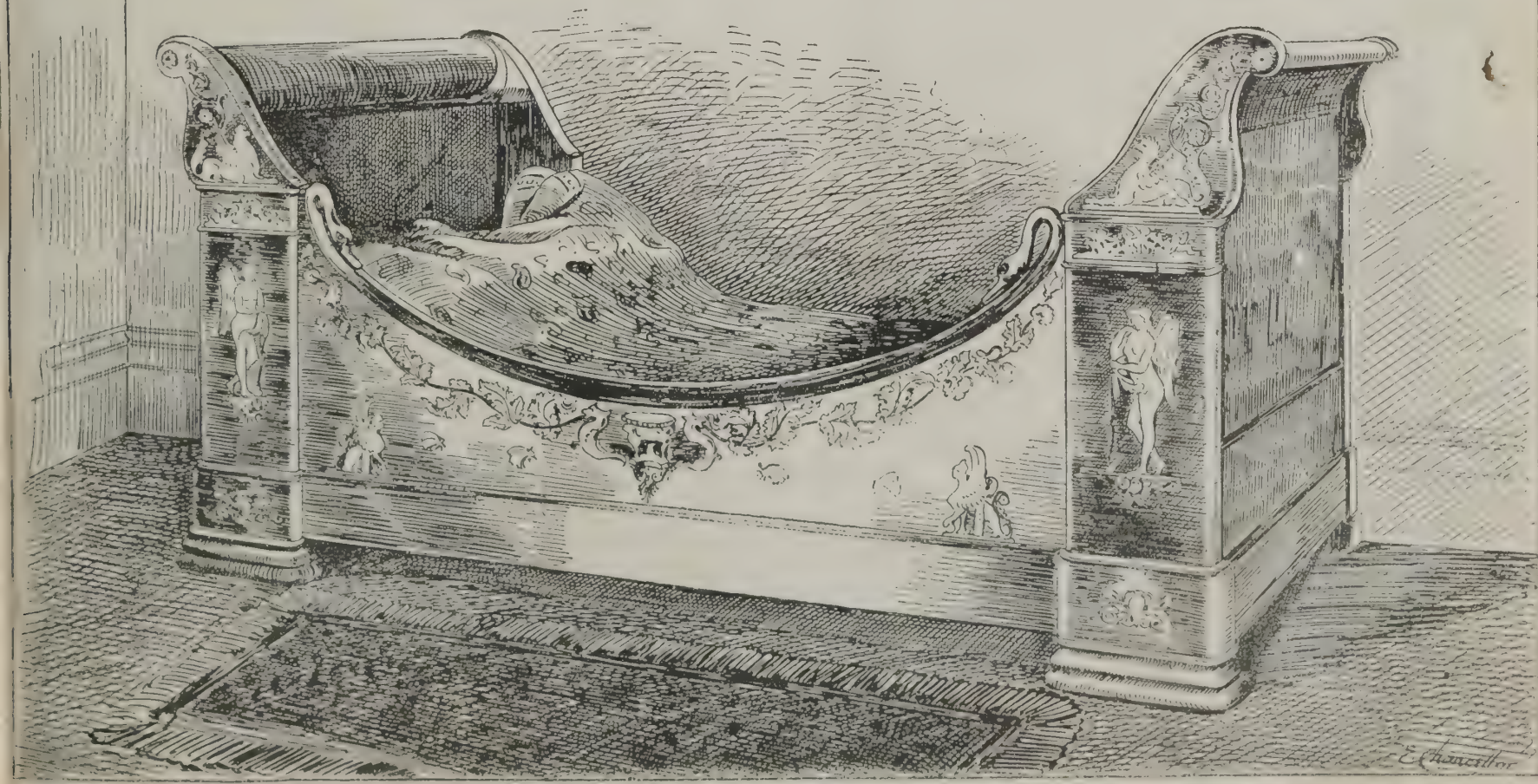
when burnt, leaves 5 per cent of ash. The brownstone "serves to absorb and neutralize any smell" produced by the combustion of the starch and serves to retard the burning.

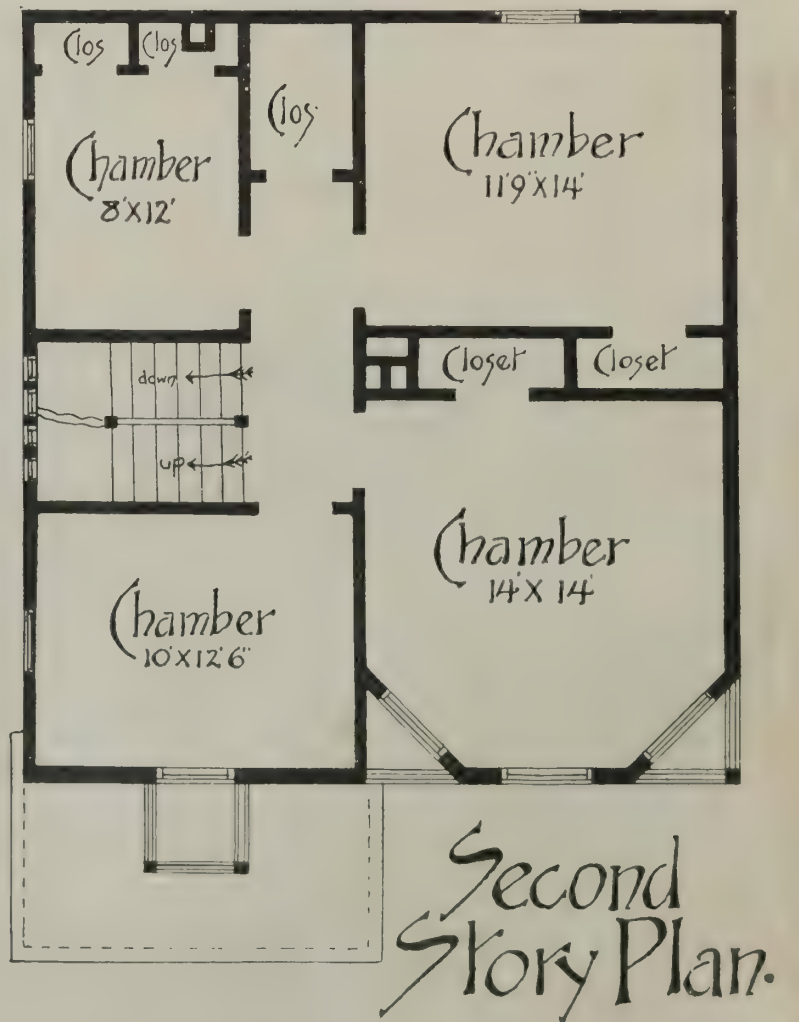
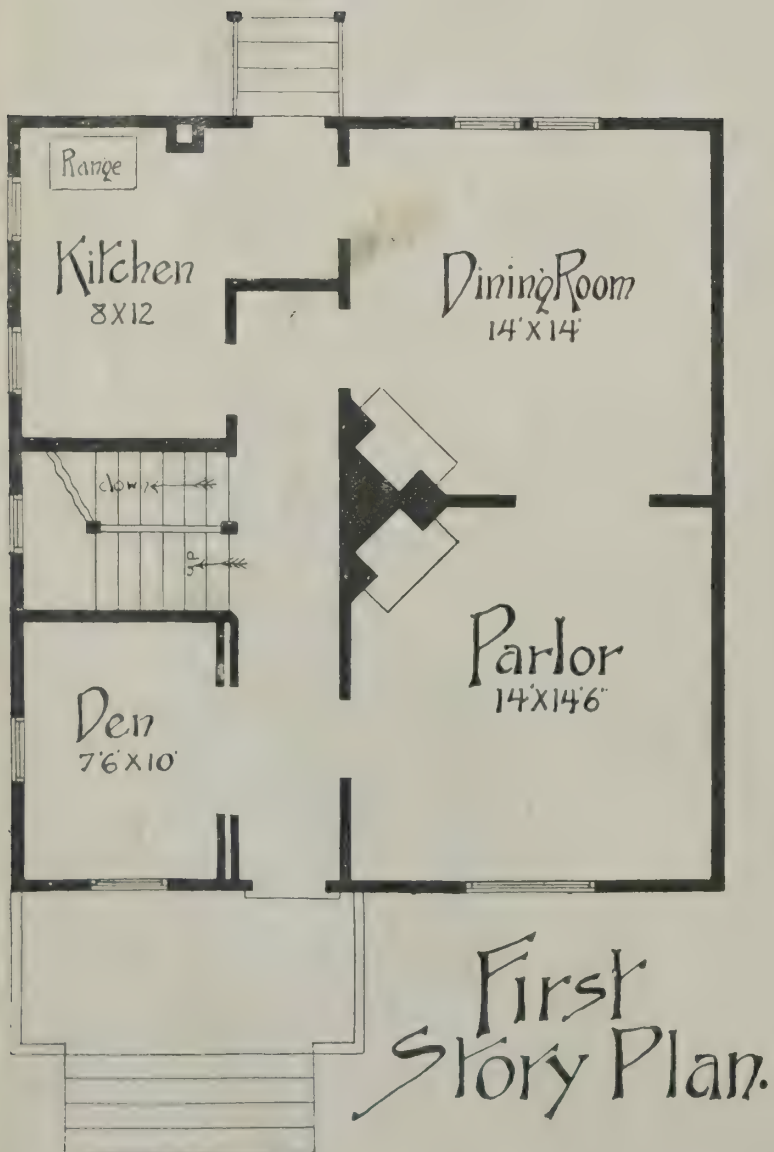
NAPOLEON THE FIRST'S BEDSTEAD.

This bedstead, recently bought at a sale, belonged to Napoleon I., and was purchased at a sale of the Tuileries furniture for 8,000 francs. It is a very fine specimen of the style of the period. The framework is of fine oak, veneered with very beautiful Spanish mahogany. The ornaments are cast in brass, wrought over and highly gilt. They are of considerable artistic merit, particularly the figures and imperial bees. — *Building News.*

NAPOLEON THE FIRST'S BEDSTEAD.

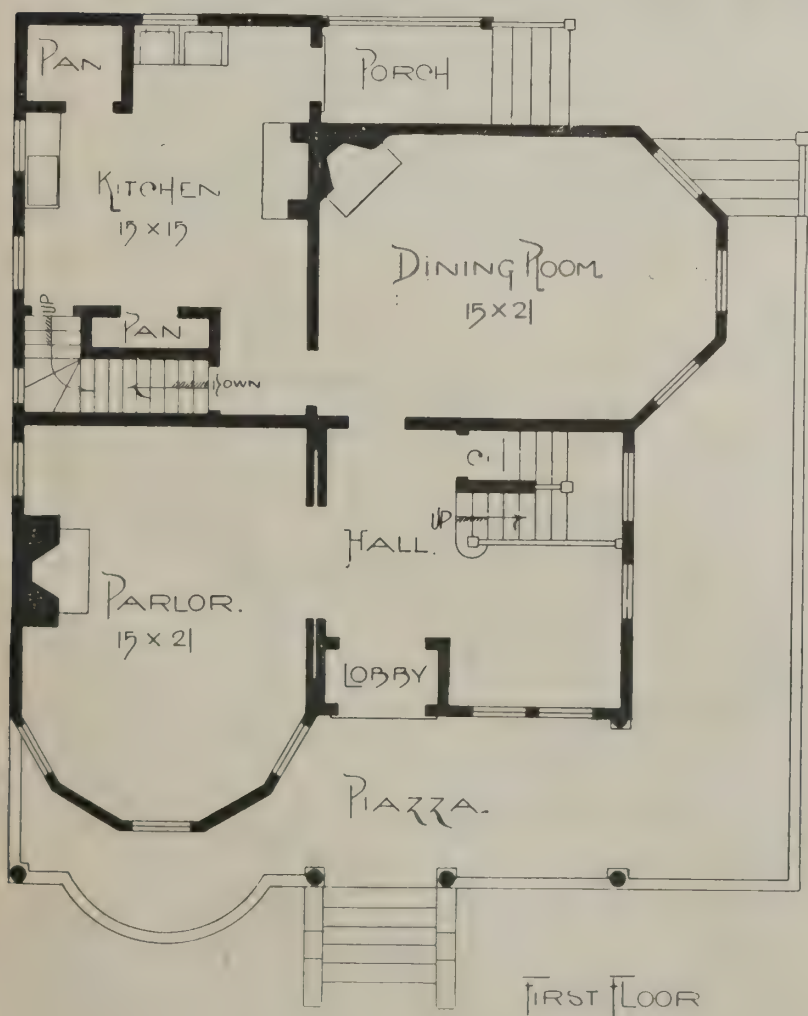
FROM THE TUILERIES





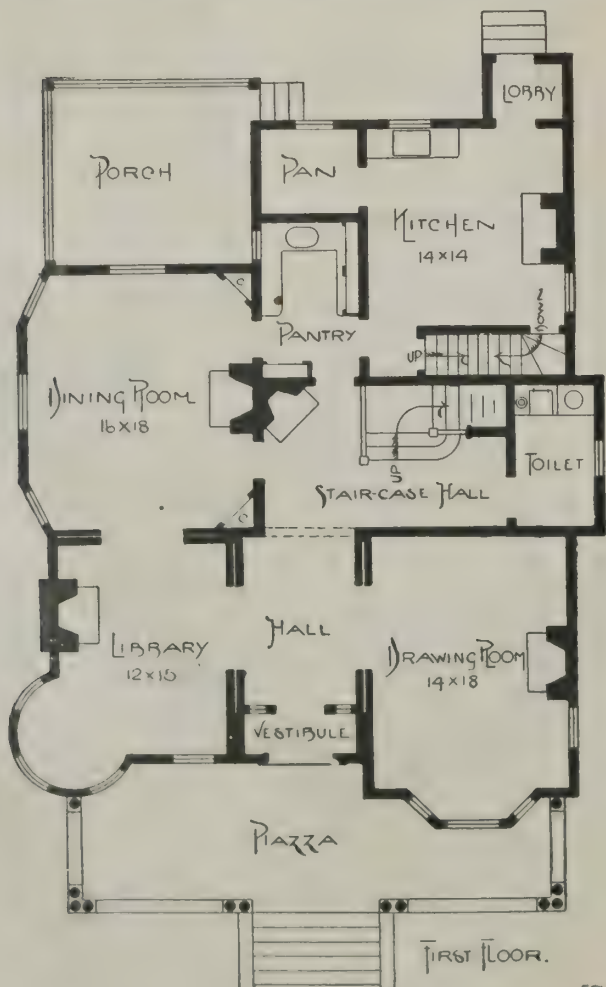
[See page 34.]

A ONE THOUSAND DOLLAR COTTAGE.



[See page 39.]

A DWELLING AT BENSON-HURST.



[See page 39.]

A RESIDENCE AT NEWARK, NEW JERSEY.

COURT HOUSE FOR LOS ANGELES, CALIFORNIA.

This building, which has occupied about two years in erection, is now structurally approaching completion.

It occupies a commanding site on an elevated plot of land, bounded by Fort, Temple, and Buena Vista Streets on three sides, and by the county police station on the fourth.

The building is traversed by a spacious corridor the whole length, on three floors, communicating with principal and two secondary flights of stairs, and giving access to the six court rooms, judges' chambers, witnesses' rooms, offices for the various civic functionaries, and large apsidal-ended chamber for board of supervisors, together with library, strong rooms, and well arranged toilet requisites for each department, janitors' and engine rooms, etc.

The structure is erected upon concrete foundation; the basement is of granite, the upper external walls of red and buff Arizona sandstone, internal walls of brick, and partitions and floors of corridors, court rooms, etc., of hollow firebrick and concrete, supported on rolled iron joists; the roofs are slated, and have buff terra cotta ridge cresting and finials, etc., and the tower and turrets are covered with copper.

The heating is by means of hot water circulation;

A DWELLING AT BENSONHURST.

We publish, on page 37, a dwelling erected for Mr. Aaron Squires, at Bensonhurst-by-the-Sea, Long Island, N. Y., from plans prepared by the proprietor. The design presents an attractive and tasty bit of suburban architecture, ornamental on the exterior, with accompanying plans, showing spacious rooms, conveniently located and fitted up in an excellent manner. Underpinning of brick. The building above this is of wood. The first story covered with clapboards and painted light olive green, with bottle green trimmings. Second story and gables shingled and painted colonial yellow, with similar trimmings. Roof shingled and painted red. Dimensions: Front, 37 ft. 6 in.; side, 43 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Floors throughout are of hard wood, laid in narrow widths. Hall trimmed with cherry, contains an ornamental staircase, neatly turned out of similar wood. This staircase is lighted with a large stained glass window. Parlor and dining room are also trimmed with cherry, and each has open fireplace, furnished with tiled hearth and hard wood mantel. Kitchen and its apartments are trimmed and wainscoted with yellow pine, finished natural with hard oil. The former is provided with sink, wash tubs, and range, all fitted up

of oak and highly polished. Parlor, music room and library are trimmed with mahogany. The fireplaces, where shown in these apartments, are furnished with tiled hearths and facings and hard wood mantels. Dining room, trimmed with oak, contains a fireplace built of brick, with hearth laid of same. Kitchen and pantries are trimmed and wainscoted with yellow pine, finished natural with hard oil. The pantries are fitted up in the usual way with bowl, cupboards drawers, etc. Second floor contains four bedrooms, with large closets and bathroom. The latter wainscoted and fitted up in the best manner. Studio, two bedrooms and storage room on third floor. Cemented cellar contains laundry, furnace and other apartments. Cost \$9,500 complete. A. M. Stuckert, of Denver, Colorado, architect.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE FOR \$1,000.

We give on page 40 two floor plans and photographic view of Mr. Wutchmann's pretty frame cottage, No. 1399 Sheffield Ave., near Grace St., Chicago, Mr. Huber architect. A veranda extends across the whole front 4' 1" above the grade line, and the main hall, off this,



THE NEW COURT HOUSE, LOS ANGELES COUNTY, CALIFORNIA.

the inlet ventilation is supplied by "Tobin tubes," and for lighting both gas and electric light will be adopted.

The tower is utilized for water supply tanks on two stages, and the upper portion has an observation room, affording a magnificent outlook over the whole city of Los Angeles and a vast extent of surrounding country.

The lower portion of the internal plastered walls will be finished with moulded and paneled dados, the ceilings of court rooms coved, and moulded, and paneled; the floors of principal rooms, oak and parquetry, and glazed tiles for corridors, etc.

A hall of records, designed in unison with the court house, is proposed to be erected on a portion of the site, so that the whole business of the city and county can be conducted in close proximity.

The building was won in open competition by Messrs. Curlett, Eisen & Cuthbertson, architects, of Los Angeles and San Francisco; and is being erected by Mr. O. E. Brady, of San Francisco, at a cost of \$750,000, under the immediate superintendence of Mr. Curlett.—*The Builder*.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.

in the best possible manner. Second floor contains four large bedrooms with closets, linen closet, and bathroom. The latter wainscoted and furnished complete. Three bedrooms on third floor. Cemented cellar, contains furnace and other necessary apartments. Cost, \$6,350, complete.

Our engraving is made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

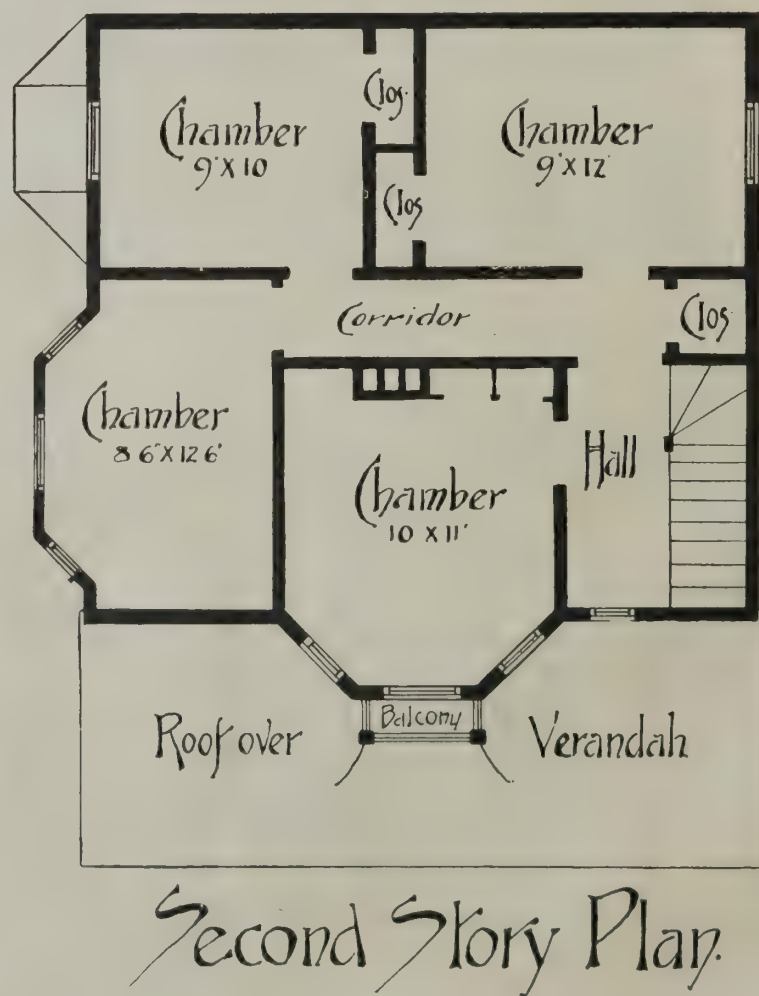
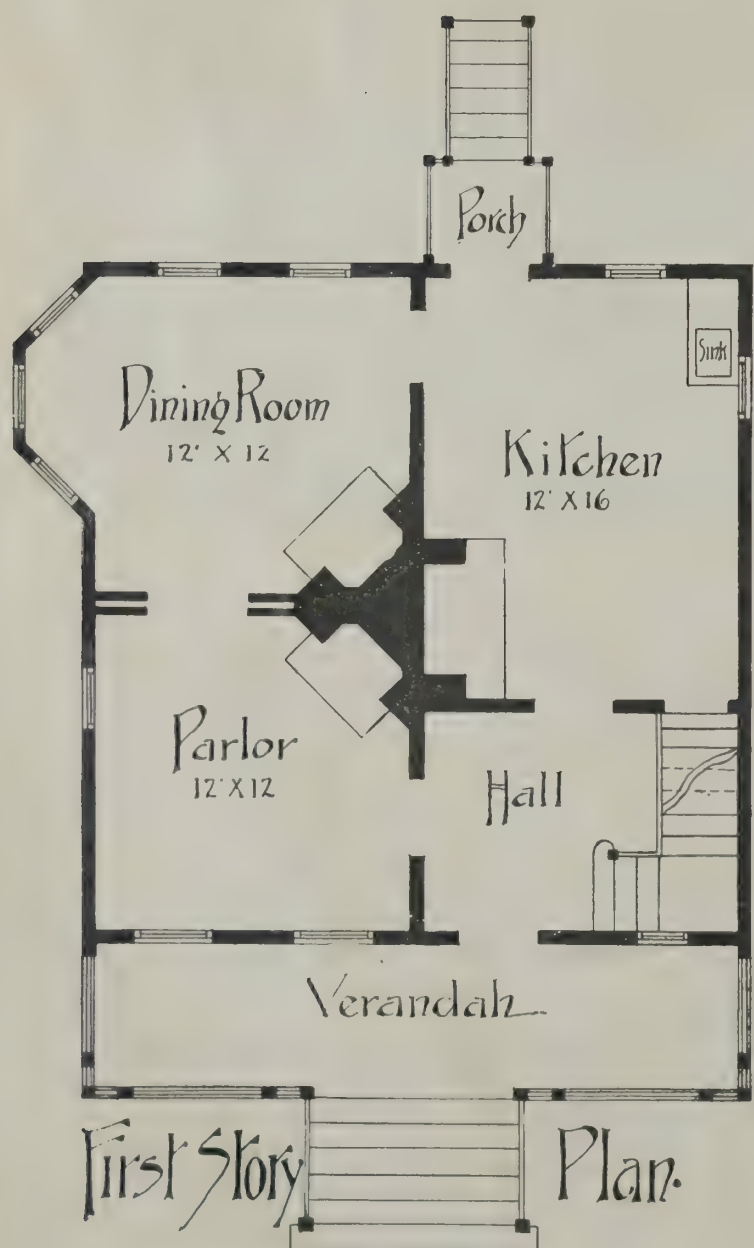
A RESIDENCE AT NEWARK, NEW JERSEY.

We present on page 38 a very attractive residence erected for Samuel Clark, Esq., at Newark, New Jersey. This house has a very picturesque exterior, a large porch at front entrance, with a balcony over, an ornamental chimney and bay windows. The accompanying plans show a convenient arrangement of large rooms, finished up in an excellent manner. Underpinning and balustrade to piazza are built of red sandstone, rock faced and laid up at random. First story is built of North Haven brick, laid in red mortar, with trimmings of red sandstone. Second and third stories are shingled and painted yellow. Roof covered with slates. Dimensions: Front 44', side 57', exclusive of porte-cochere. Height of ceilings: Cellar 7', first story 10', second 9', third 8'. Vestibule has a tiled floor. Hall (10' wide) is trimmed with antique oak and it contains an ornamental staircase with carved newels. This staircase is lighted by windows glazed with stained glass. The lobby under these stairs forms an entrance from porte-cochere and contains bowl replete. Floors

contains a handsome oaken staircase. The parlor opens off the hall to the left, and is heated by an angle fireplace. It opens into the dining room by sliding doors, and measures 12' x 12'. The dining room is entered from the parlor, and the kitchen is situated at the rear of the parlor and lighted by large bay window and two small windows. The kitchen measures 12' x 16' and contains range, sink, etc., and opens on to rear porch. On the second story there are four chambers and convenient closet room. A pleasant balcony opens off the bay window of the front chamber. The house is cellared throughout and the basement story is built of light stone, the upper stories being covered with clapboards and the roof is shingled. It is situated amid pleasant surroundings and is estimated to cost \$1,000.

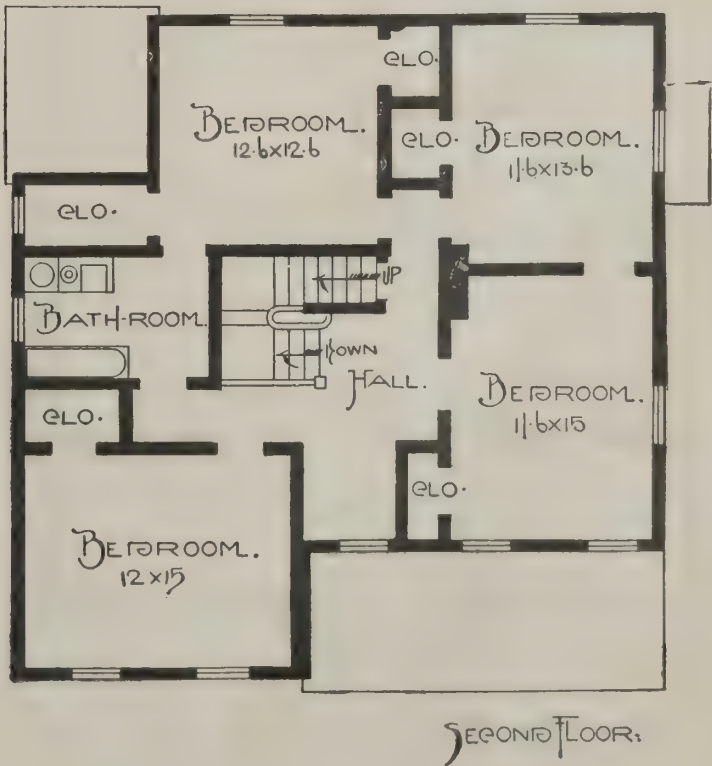
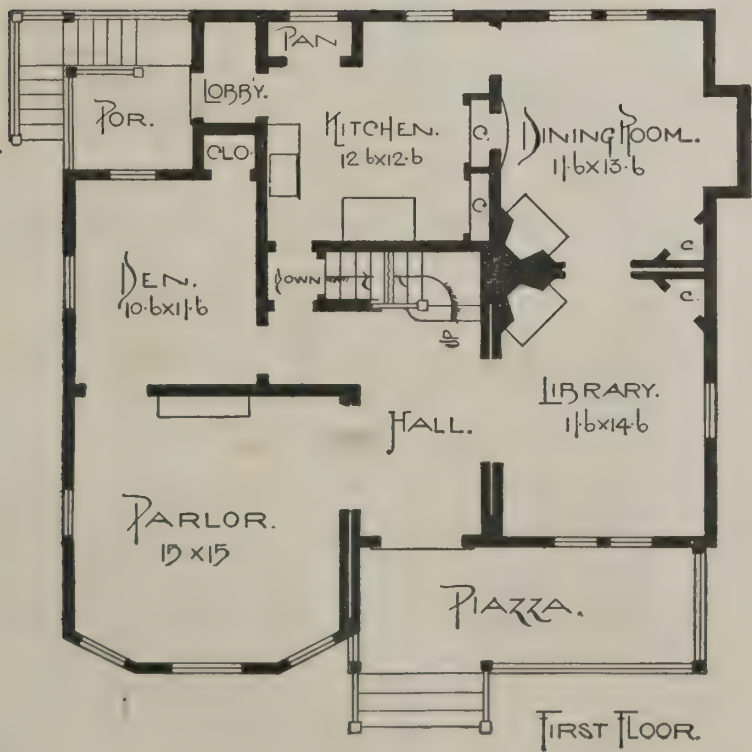
Cement for Parchment Paper.

The best cement for pasting parchment paper, according to a lithographic authority, is casein glue. It is much better than so-called chrome glue, because the latter produces yellow or brownish spots where it has been employed. Casein glue is a solution of casein, which appears as whey or drop when milk is allowed to curdle. The glue is dissolved in a saturated solution of borax; when dried in the form of transparent gelatine it appears as grayish white and somewhat brittle matter, which can be easily dissolved in water and possesses great adhesiveness. When employed for pasting parchment paper a thin paste is prepared, used in the customary manner, and the jointed places afterward exposed for a little while to a jet of steam.



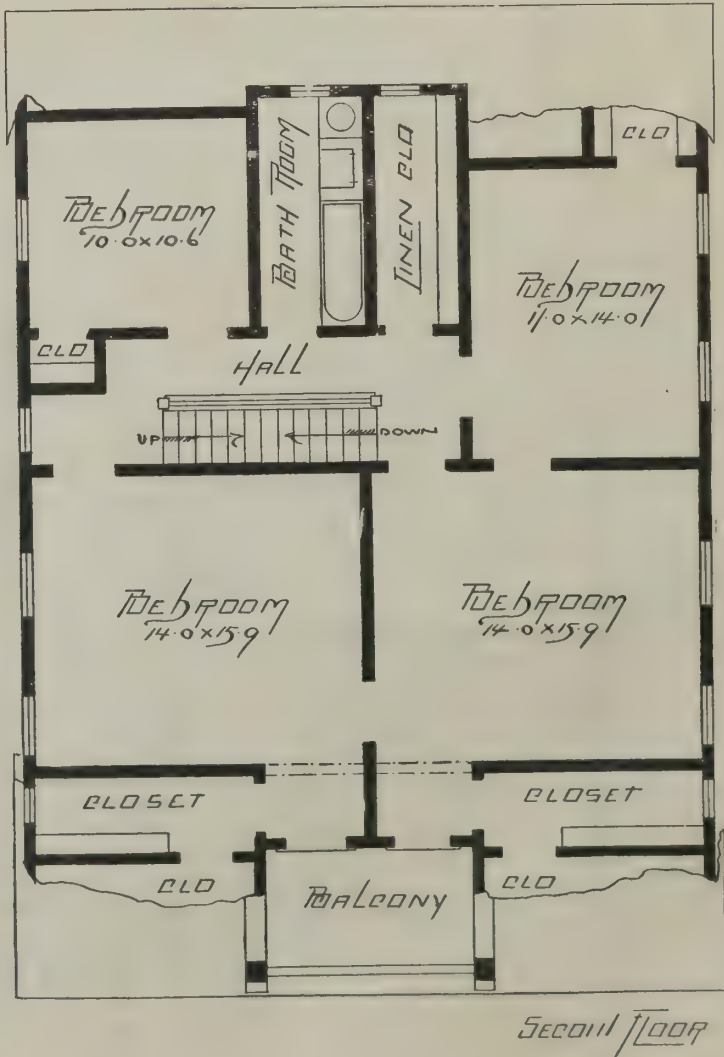
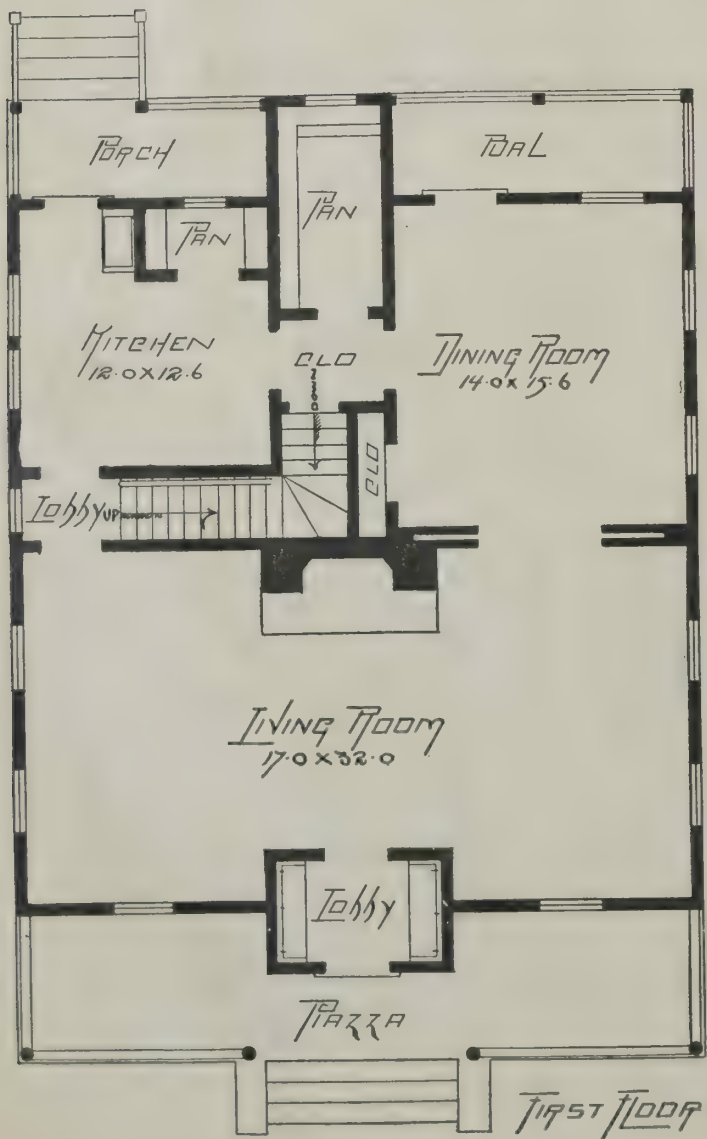
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A COTTAGE FOR ONE THOUSAND DOLLARS.



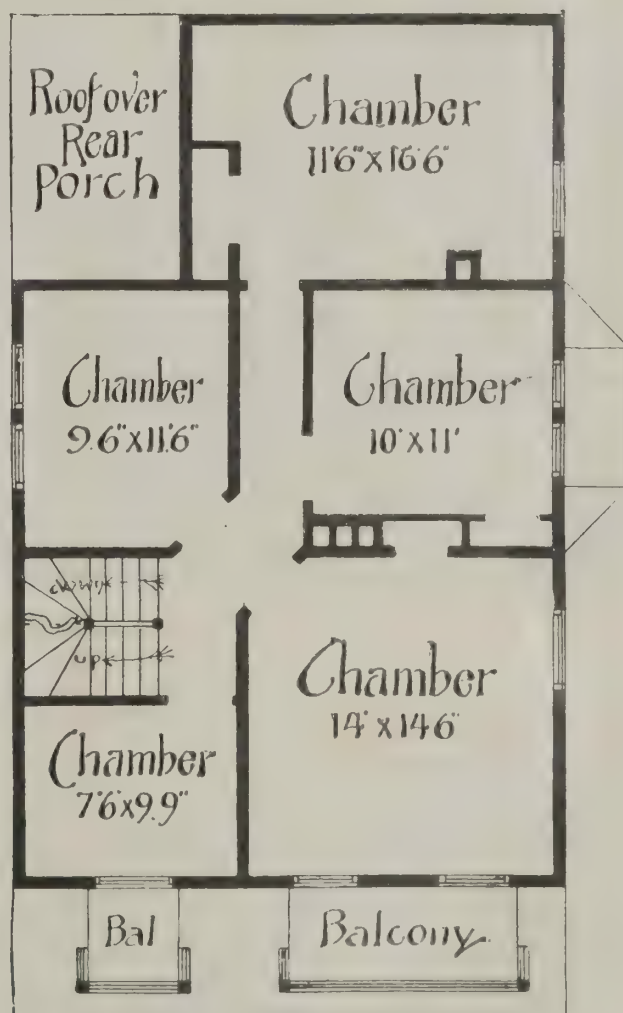
[See page 44.]

A DWELLING AT ARLINGTON, N. J.



[See page 44.]

A DWELLING AT STAMFORD, CONN.



First
Story Plan

[See page 44.]

Second Story Plan.

Cottage at Munroe Ave, Hyde Park, Chicago.

A DWELLING AT ARLINGTON.

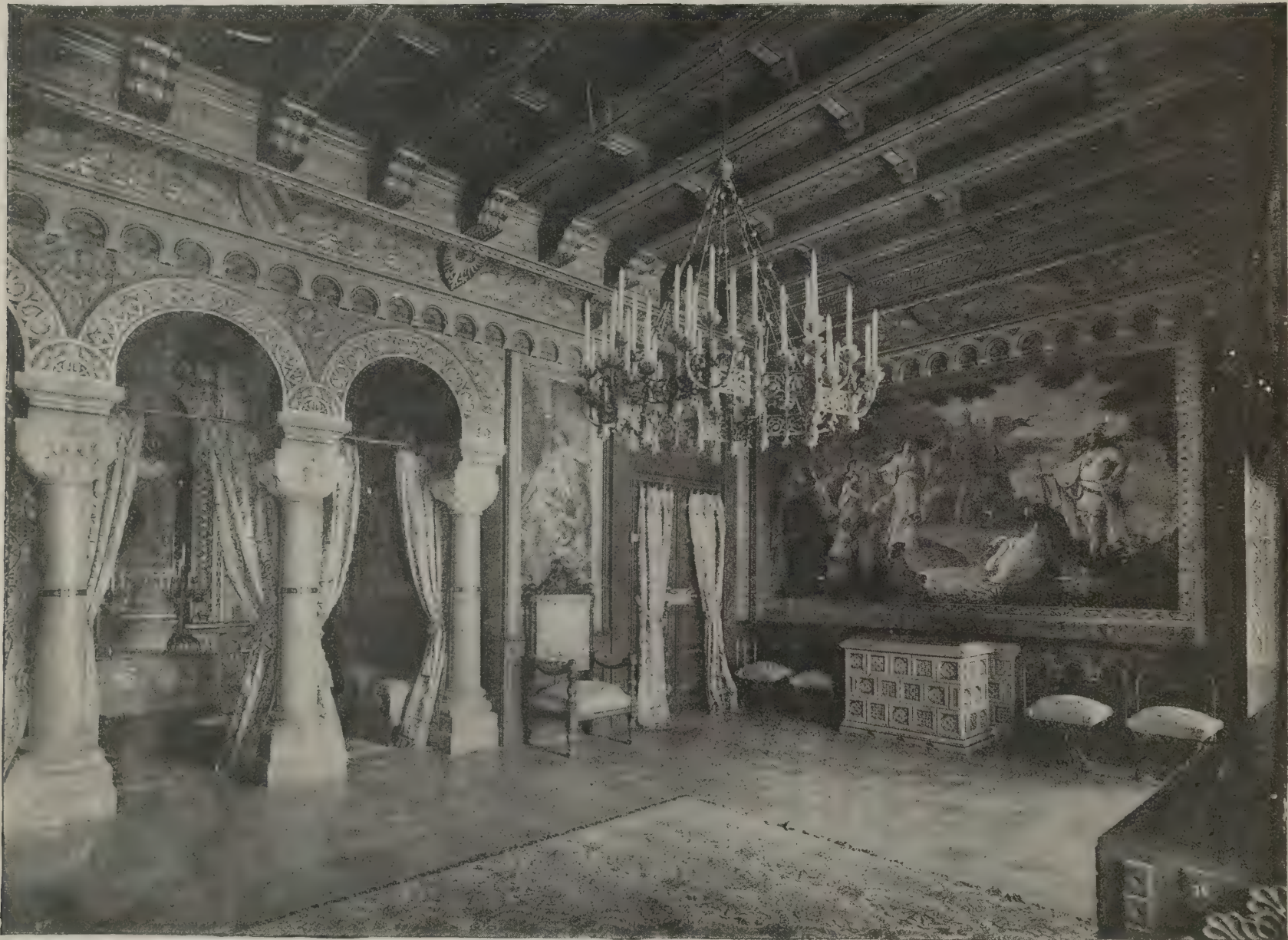
We present on page 41 a modern dwelling of low cost, erected for J. Albert Stowe, Esq., at Arlington, New Jersey, from plans prepared by the proprietor. Dimensions: Front, 38 ft. 6 in.; side, 37 ft. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. Foundation is built of good quality stone, with footings under same. The underpinning is of similar stone, laid rock faced and neatly pointed up. The exterior frame work is sheathed with hemlock boards, covered with paper, clapboarded and painted pearl gray, with trimmings of a darker shade. Gables and tower are covered with circular butt shingles. Roof rafters are covered with boards, paper, and then slated. Cellar, under whole of house, has a cemented bottom 2½ in. thick, and contains laundry and furnace complete, also ash pits connecting with fireplaces. The floors throughout are of Georgia pine, laid in widths not exceeding 3½ in. Hall, parlor, and library are trimmed with quartered oak, and the other apartments are trimmed with white pine, finished natural. Hall staircase is paneled complete with oak, and furnished with ornamental newels, posts, etc. The fireplaces in

spacious and well lighted, is provided with a very large open fireplace, built of Tiffany brick, with terra cotta mantel shelf. Dining room connects by sliding doors; it opens out upon a balcony, with movable glass windows, which is utilized as a conservatory. Hall contains staircase, with rail supported on ornamental iron brackets; the second floor has newels, balusters, etc., neatly turned. Kitchens and pantries are wainscoted and provided with all the best improvements. Second floor contains four bedrooms, linen closet and bathroom, the latter fitted up in the best possible manner. Rooms can be finished in attic, if desired. Ceilings corniced. Heated by a furnace. Cost \$4,000 complete. Our engraving is made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

COTTAGE AT MUNROE AVENUE, HYDE PARK, CHICAGO.

We publish on page 43 two floor plans and a photographic view, taken specially for the SCIENTIFIC AMERICAN, of the above cottage, which is owned by Mr. Mahegan. It is nicely situated, with pleasant sur-

unglazed tiles, form access to church auditorium even with floor, and through hall to Sunday school room, the hall having stairs leading to basement and tower. Organ and choir loft are at the rear of church, somewhat elevated above the pulpit platform, with choir ante and pastor's study on either side, the latter having a fireplace furnished with tiled hearth and hard wood mantel. The floor of the church auditorium is on a slight incline and the seats are arranged in circular form. The Sunday school auditorium is located at the front of church, and is separated when necessary by large folding doors that slide into pockets. On either side of this room are the parlors and class rooms, which can be removed when desired, by large sliding windows. The interior throughout is trimmed with white pine, stained and finished in cherry. The pews, pulpit, rail and all wood work around same is of natural cherry. Both auditoriums are lighted by large chandeliers. The windows are glazed with stained glass with good effect. The seating capacity is 1000, divided as follows: Church, 450; Sunday school, 300; class rooms, 250; total, 1000. The basement (or cellar) contains furnace and other apartments. Cost \$38,000 complete. Messrs. L. B.



CASTLE NEUSCHWANSTEIN IN BAVARIA—THE KING'S PARLOR IN THE PALACE.

library and dining room are provided with marble hearths and mantels. The parlor has a bronze mantel. Kitchen is wainscoted 3 ft. 6 in. height with narrow beaded stuff. It is planned conveniently, and furnished with numerous shelves, drawers, cupboards, pantries, etc. There are four bedrooms, large closets, and bathroom on second floor. Two rooms on third floor. Cost \$4,800, including furnace, range, cistern, gas, and everything complete ready for occupancy. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT STAMFORD, CONN.

Our engraving, page 42, illustrates a dwelling erected for Dr. G. F. Lewis, at Stamford, Conn. Lambert & Bunnell, of Bridgeport, Conn., architects. Dimensions: Front, 33 ft.; side, including piazza, 46 ft. 6 in.; height of first story, 9 ft.; second, 8 ft. Underpinning built of cobblestone laid at random. First story clapboarded, painted light olive green, with bottle green trimmings; second story shingled, painted colonial yellow; roof, shingled, painted green. Piazza, columns, balusters and rail, of yellow pine, finished natural, in hard oil. The interior, arranged conveniently, is trimmed with yellow pine, finished natural; floors of similar wood laid in narrow widths and highly polished. Lobby at entrance is wainscoted and ceiled with beaded stuff, laid in panels. Living room or parlor,

roundings. The house is cellared throughout and has solid stone foundations 18 in. thick. The first story is frame, covered with clapboards; the second is also frame, covered with shingles, and the roof is also shingled. The veranda extends across the whole front and is 4 ft. 1 in. above the grade line. The parlor is 14 ft. × 14 ft., with pleasant view to the front, has a handsome fireplace, and connects with both the hall and library. The dining room is 11 ft. 9 in. × 13 ft., with mullioned window and large fireplace; it connects with the hall and library, also with the kitchen. The library is 11 ft. 9 in. × 13 ft. 6 in., with angle fireplace and large bay window, and is entered either from the parlor or dining room. The kitchen is 11 ft. 6 in. × 11 ft. 6 in., has large pantry, range, sink, etc., and a large rear porch. The second story contains five commodious chambers; the two front ones having pleasant balconies. The estimated cost is \$2,800.

MOUNT VERNON M. E. CHURCH.

Our engraving, page 46, illustrates the first M. E. Church at Mount Vernon, New York, built of pressed brick, with trimmings of terra cotta and brownstone. The roof is covered with slate and is trimmed with terra cotta cresting and finials. The architectural beauty is complete, as the engraving herewith demonstrates. The extreme width of the building is 79' 4", and the depth 137' 8". The main vestibules, paved with

Valk & Son, of Brooklyn, architects. Our engraving is produced direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

CASTLE NEUSCHWANSTEIN, IN BAVARIA.

After the tragic end of the unhappy dreamer on the Bavarian throne, his marvelous palaces—which had been built with the greatest secrecy—were opened to the astonished world. When the first excitement of the surprise had passed, opinions of all kinds, from narrow-minded fault-finding to enthusiastic exaggerations, were heard from the laity, while many artists and connoisseurs expressed a certain contempt for the palaces of Ludwig II., as mere imitations of old and celebrated structures, and for the artistic treasures and technical work therein, as nothing extraordinary. But this hasty judgment was unjust, for, although Herrenchiemsee and Linderhof were copied, to a great extent, from well known French models, and Neuschwanstein borrows largely from the Wartburg, still, in the monumental form of the whole work and in the lavish richness of the execution, there are many proofs of artistic originality and great technical skill. And, furthermore, the influence exerted by the immense orders of King Ludwig II. on the development of artistic work in Germany should not be undervalued.

Of the three castles named, Neuschwanstein, near Schwangan, was begun first. As early as 1860 plans for

the new castle occupied the mind of the king, who had spent much time in the beautifully located Hohen Schwangau, which had been restored by Maximilian II. The development of these ideas was aided by the first works of Richard Wagner, who found a magnanimous patron and friend in the Bavarian king. Ludwig II. wished to realize in Neuschwanstein the ideal of a castle of the early middle ages, as he desired to produce in Herrenchiemsee a complete copy of a magnificent castle of the time of Ludwig XIV., and an ideal Gothic castle in Falkenstein, the plans for which were never carried out.

The construction of Neuschwanstein was begun in 1869. It stands on the top of the great Tegelfelsen, three sides of which are steep precipices. A beautiful road, which had to be cut in the resisting rock or built up with masonry, leads from the village of Schwangau to the castle, placed where the ruins of the old Castle Schwangau stood. Before the eastern approach, the only entrance to the castle, a ditch was blasted out of the rock and over this a drawbridge was built. The *Thorbau* (gate house), completed in 1873, contains several living rooms furnished in a comparatively simple manner, which the king occupied before

in the fourth story. All the rooms of the king's apartments, except the Gothic sleeping room, are finished in the Roman style, the walls being decorated with paintings. Those in the parlor are from Lohengrin, painted by Von Hauschild; in the workroom, from Tannhauser, by Aigner; in the dining room, scenes from the life on the Wartburg, by Ferdinand von Piloty; in the sleeping room, Tristan and Isolde, by Spiess; in the dressing room, scenes from the life of Hans Sachs and Walther von der Vogelweide, by Ille. Our other engraving shows the living room, in which the prevailing colors of the carpet, furniture and hangings are blue and white. The throne room, which is separated from the king's apartments by a vestibule, is finished in the Byzantine style, the walls and the arched ceiling being richly decorated. A gallery supported on pillars extends around three sides of the hall, and on the fourth side there is a semicircular recess, in which the ivory and gold throne stands on a platform raised nine steps above the floor of the hall.

The music hall (*Sangersaal*), in the fourth story, is modeled after the hall in the Wartberg which bears the same name, but it greatly surpasses the model in richness and splendor. The wall paintings by August

of sulphur and lime is a good way to eradicate mildew. To keep green fly down a good syringing is preferable to fumigating, as the tobacco smoke is sometimes very destructive to the buds, depriving them of their color as well as deforming them. The plants should not be given a top dressing of rotten manure till spring, as it excludes the air from the roots at the very time it is most needed. If they want a little nourishment before that time, some bonemeal worked into the soil will be found very useful.

The varieties we grow are Lady Catherine Mermet, the Bride, Perle des Jardins, Papa Gontier, Bon Silene, and Niphetos. They are all excellent roses, the last three being very free, while Lady Catherine Mermet and the Bride are the two most lovely roses in cultivation, being of superb form and great purity of color. A vase filled with some three or four dozen flowers of the two last-named varieties, arranged loosely and artistically, is exceptionally beautiful. The plants are propagated from a single eye. Good solid wood, such as that from which a bloom has been cut, is the best. The cuttings are struck in clean, sharp sand in an open bench in the propagating house, with a top heat of 50° and a bottom heat of 65°; they root in about four



CASTLE NEUSCHWANSTEIN IN BAVARIA—THE DINING ROOM IN THE GATE HOUSE.

the completion of the castle, so as to be on the spot to watch the work. One of our engravings shows the *Thorbau* dining room, the walls of which are decorated with scenes from the tales of chivalry, painted by Schwoiser.

By passing through the *Thorbau* we reach a court which is bounded on the north by the *Ritterbau*, with its large tower (*Bergfried*), and on the west by the King's palace. On the south side the palace and the gate house are connected by the *Kemenatenbau*, which is scarcely above the foundation walls; and the chapel was to have been built between the *Ritterbau* and the *Kemenatenbau*. Only the palace and the gate house have been completed. The latter is an immense structure with two towers, and is crowned by a copper roof. The west gable is ornamented by a two-story cupola with a gilded roof, and the east gable has a balcony above which, to the right and left, are paintings of the Madonna, with the child Jesus, and of St. George. A charming view can be obtained from the staircase tower, which extends high above the ridge of the roof, on the north side. The walls of the building are covered with blocks of marble and sandstone. The ground floor and first and second stories contain the housekeeping rooms, heating arrangements, rooms for retainers and servants. The king's apartments and the throne room are in the third story, and the music hall occupies all the space above the king's apartments,

Spiess represent scenes from the Parsifal.—*Blätter für Architektur und Kunsthandwerk*.

[THE GARDEN.]

Forcing Tea Roses.

The plants are propagated the second week in February, potted into 2 inch pots and kept growing, a shift into other pots being given as they require it. By the first week in July they are good plants in 4 inch or 5 inch pots, from which they are planted into the benches in the houses, the benches being made to hold 5 inches to 6 inches depth of soil, which is composed of good turfy loam and about one-fourth part of thoroughly decayed manure. The plants require all the air that can possibly be given them while at rest in the summer and frequent syringing to keep them clean and healthy. During the autumn they receive the same treatment, only they are more closely watched, as cold winds are sometimes very destructive and should not be allowed to blow in upon them.

I am greatly in favor of ample ventilation to let the warm close air escape. Great care is needed in watering during the dark days of November and December, as if the soil once gets soaked with water the plants are injured. They should be kept at a day temperature of 60° to 65° and a night temperature of 50° to 55°. Painting the pipes here and there with a paste made

weeks and are potted when the roots are about an inch long.

R. H. C. BAIRD.

Rochester, N. Y.

PATENTS.

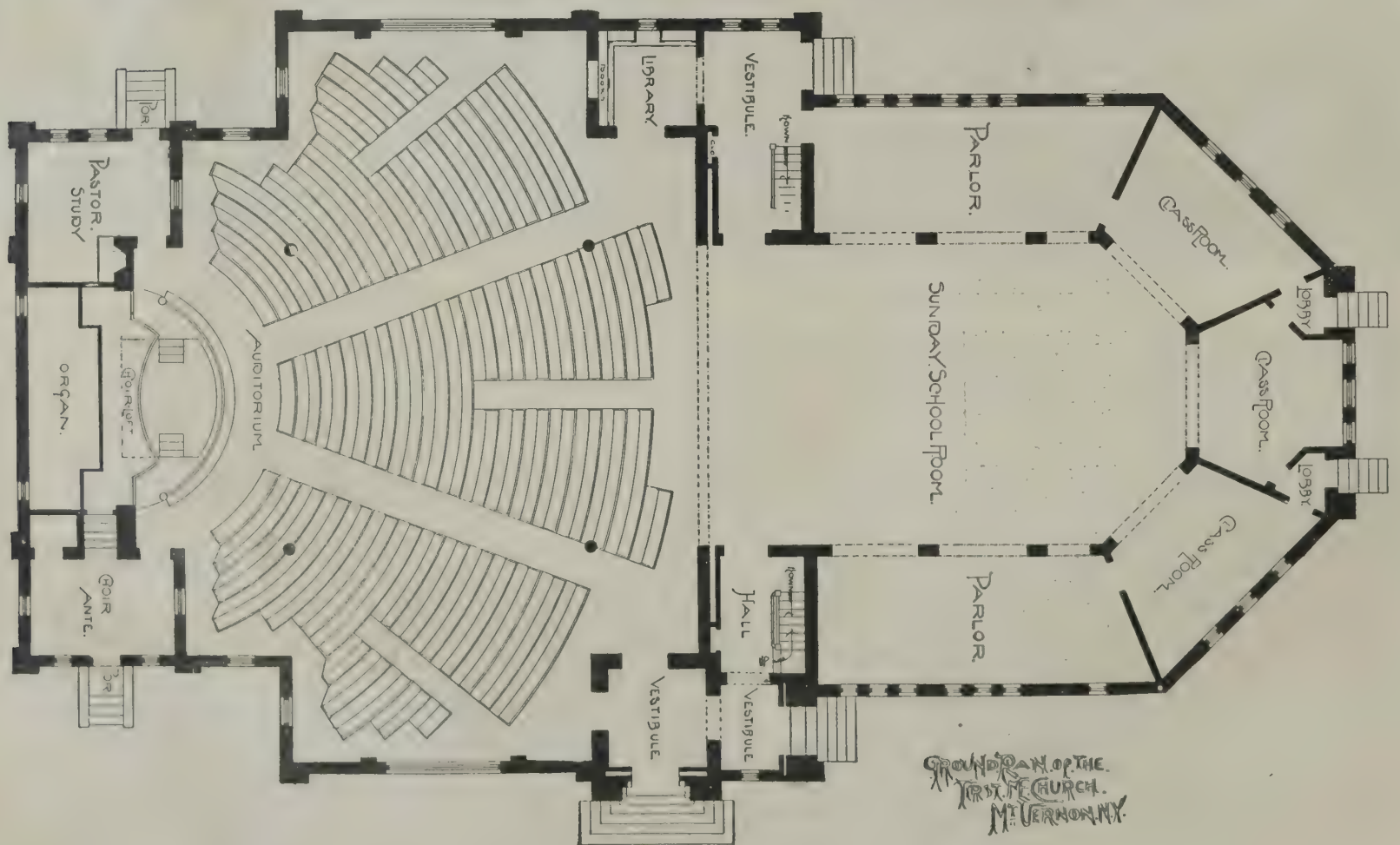
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[See page 44.]

MOUNT VERNON M. E. CHURCH.

The Exclusion of Rats and Mice from Dwellings.

While a dwelling, particularly a suburban one, is in the act of construction, little thought, if any, is given to the best means of avoiding the rat nuisance. After the pests have once effected a lodgment, it seems, sometimes, impossible to drive them out. The latest trap is hunted up with avidity, the enterprising Maltese cat, the traditional foe of all rodents, is turned loose upon the enemy, partitions, floor and ceiling spaces are vigorously fumigated, but still the Hungarians refuse to budge, and all assaults prove fruitless.

Rats and mice enter the house to a large extent through the sewers, and where sewers are not in use, they enter the cellars to find secure retreats in the spaces between the walls, in partitions, in the floor spaces that are floored and ceiled, and it is generally believed that a rat's idea of heaven is a roomy, gloomy, neglected attic.

Builders will inform you that if the base boards fit tight and the flooring is securely nailed it is impossible for rats or mice to enter a house. It is to the size of the *if* that we take exception. For instance, go through any newly built house and examine the floors in the closets. Upon careful inspection in many places boards will be found having knots knocked out, and sometimes two boards will have been laid so carelessly that the tongue at the end is broken off and a good sized chip with it; also in the closets the base board is apt to be put up in a slovenly manner, with wide gaps. Closets are often floored and fitted with the odds and ends that are lying about after the main floors are laid. Hence, it is no wonder that rats and mice find it so easy to gain access to partitions and floor spaces even in new houses.

In the course of time, as the timber in a house becomes dry, knots fall out, base boards pull away from the studs, the house settles unevenly, and tends to enlarge all crevices, so that rat entrances are innumerable. Now, what is to be done? Two methods have been tried, with a large measure of success.

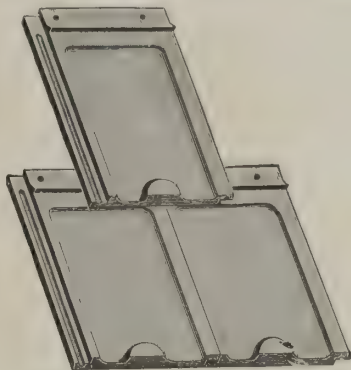
1st—If the spaces between the studding to the height of one foot above each floor, all around the house, be packed with mineral wool, and the floor space between joists for one foot inward from the outside wall, on every floor in the house, and the total floor space, beneath every closet and pantry in the house, be packed with the same material, rats and mice will not trouble the house. It would be safer to fill in completely the wall spaces about a pantry with the mineral wool. Mineral wool consists of minute hairs of glass, sharp as

and stretch wire netting across each open space between the studding horizontally, and vertically across the space between the joists, and stretch the netting full across the floor joists beneath every closet and pantry floor in the building. These precautions, if faithfully carried out, will be quite effective.

Many an old house that has been well built would be almost rat proof if its base boards and mouldings were to be taken out and relaid, and this can be done at a very small expense; new boards should not be put in if it can be avoided, as the old boards will not be likely to shrink much when relaid, even if they have to be sawed some in the refitting.

A THOROUGHLY FIRE PROOF ROOF.

The roofing tile shown in the accompanying illustration is regularly made of a size $6\frac{3}{4} \times 10$ inches, the ex-

**FIRE CLAY ROOFING TILE.**

posed surface of the tile when laid on the roof being 6×8 inches. Its color is a bright red, requiring no paint, and its average weight is 30 ounces, making the weight of a square on the roof 562 pounds, or less than that of slate as ordinarily put on. The tile is ornamental, durable and cheap, and is water proof and frost proof, as well as fire proof. The gutters along the side prevent water getting through to the roof, and a projection near the top prevents rain and snow from being blown under. There are ribs on the under side which strengthen the tile, giving it a good bearing on the roof, and forming a lock preventing it from being moved by the wind. Each tile is formed under pressure and burned nearly to vitrification, thus making a surface on which firebrands might rain without

Steam Pipe Required for Heating.

The question often arises, How much pipe is required to heat a building of a certain cubic capacity? Of course, this varies with the temperature of the steam used, the degree of heat required to be kept up, the frequency with which the doors are opened, the temperature of the outside air, the intensity of the wind, the area of window surface, etc. There are no two places in which the conditions are exactly alike, and it would be hard to lay down an absolute rule for any fixed set of conditions. But there are some good data which will do to start from, and a writer of the *Mechanical News* calculates it as follows:

We may start out with the fact that one unit of heat will raise $55\frac{1}{2}$ cubic feet of air from 62° to 68° F., and can use these figures, no matter what the temperature and the steam are of the building to be warmed, or what outside atmosphere.

For low pressure steam—say about 5 pounds above atmosphere or by the gauge—the length of 4 in. pipe required for heating the air is found by multiplying the volume of air in cubic feet per minute, to be warmed, by the difference of the temperatures in the room and outside, and dividing by 336. The answer will be the length of 4 in. pipe in feet, and will be also about the number of square feet of pipe, as a 4 in. pipe has 12.57 in. circumference. Hence but a very trifle over 144 square in. of surface per foot of length. (For 1 in pipes the divisor required is 84, instead 336.)

It will take one square foot of direct boiler surface, or its equivalent of floor surface, to keep a temperature of 60° F. in a room with steam at 5 pounds by the gauge, and the ordinary range of temperature in and out of the room.—*Scientific American*.

FINE HARD WOOD STAIRCASE AND HALL WORK.

The accompanying illustration of a staircase and hall represents the very excellent character of hard wood finish for interiors designed and executed by the Willer Manufacturing Company, of Milwaukee, Wis., and is copied from their handsome catalogue, No. 9. The company have lately devoted especial attention to the furnishing of the highest quality of fine interior hard wood work for first class buildings, employing for this purpose special artists and designers and the most skillful workmen.

If any of our readers have made an invention for which they have thoughts of taking a patent, they

**A HANDSOME STAIRCASE AND HALL IN MILWAUKEE, WIS.**

needles, and it is difficult for mice or rats to make a passage through the material. It has been found an effective barrier to their movements.

2d—The second method in some respects is not so good as the first, but it has been tried with good results in old houses. It is as follows:

Drive the rats out of a house as well as possible by fumigation with burning sulphur, then ceil the joists in the cellar of the house with fine steel wire netting. Take out the base boards on the first and second stories

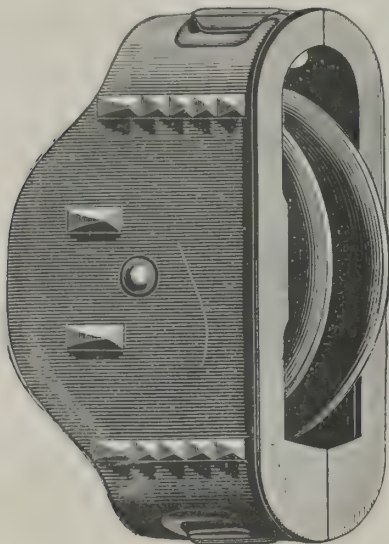
effect. This tiling is made by the Clay Shingle Co., of Indianapolis, Ind., who also make a beautiful cresting and terminal for the hips of roofs, and cut the tile before burning to fit the angle of any valley required.

THE RICHMOND STOVE COMPANY, Norwich, Conn., have just issued a handsome catalogue of their sectional steam and hot water heater, giving tables of capacity, price list and general information. It will be freely sent to parties interested applying therefor.

are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.

A NEW SASH PULLEY.

The illustration represents a new sash pulley of special design, adapted to the needs of house builders or mill men, as it can be applied by hand or machine. It fits equally well an auger or machine mortise; has markers on either side for spacing the distance to bore holes and barbed ribs for holding the pulleys in place. It is a perfect fit and needs no screws or nails to keep it in position. It has cone bearings, which render the operation of the pulleys practically noiseless, as the wheel runs midway between the two walls or sides of the case. The friction is reduced to the minimum, on ac-



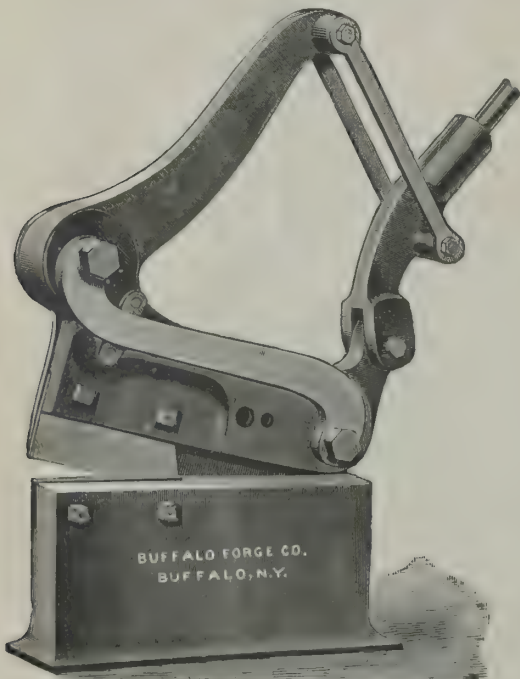
THE "IDEAL" SASH PULLEY.

count of its cone bearings and the improved method of manufacture. This new pulley is known as the "Ideal" No. 5, and is made by the Storer Mfg. Co., Freeport, Ill.

A NEW HAND TOOL FOR SHEET IRON WORKERS.

We illustrate herewith a new tool for sheet iron workers, etc. It is especially valuable for boiler and other shops where a very effective hand shear is required. The unique mechanism of this shear consists in a combination of levers, so arranged that the cutting is done from the bottom. By actual test it is said this enables one man to do more work than two men could with the old style down-cut machine, where the pressure is against a dead weight. In the items of power, durability, and compactness, it has proved its superiority, having been under continuous service for several years, before the tool was placed upon the market. The tool is made in four sizes, to shear $\frac{1}{8}$ in. flat iron up to $\frac{3}{8}$ in. The machines are listed to do no heavier work than may be done with perfect ease. All parts of the machine are interchangeable, and are made to a standard size, so that when put together the result is a well-fitted tool.

The manufacturers of this machine, the Buffalo Forge Co., Buffalo, N. Y., have also brought out a



THE BUFFALO CONTINUOUS SHEAR.

combined tool, consisting of a punch, shear and bar cutter, its general mechanism being similar to the shear. It is a machine that permits the operator to use it either as a punch, shear, or bar cutter, without a helper. Furthermore, no adjusting is required in changing the work, as the tool may be placed to any of its uses at any time, by way of variety, and for jobs where the combined arrangement would seldom be used. The hand punch has also been perfected, the principle of mechanism being the same as for the combined tool and the shear.

Venetian Blinds.

On account of their rapidly increasing business, the Venetian Blind Company have decided to erect a large three-story addition to their already extensive factory. The sliding blinds and screens and Venetian blinds made by them are in use in nearly every State and Territory in the Union. They also send large quantities to many foreign countries.

This business has had a remarkable growth since it was organized seven years ago, the business for the first year amounting to but 6,690 blinds, while for the year ending May 30 the company made and shipped on orders only 26,673 blinds, an increase of nearly 400 per cent.—*Burlington, Vt., Free Press, July 31.*

East India Roofs.

A correspondent of the *Roofer*, writing from Colombo, Ceylon, says:

The buildings are higher in the middle than at the front and rear, so as to form an ordinary sloping roof. The slope differs from that of home in being much steeper—being from 50 to 75 deg. The ridgepole is a heavy bamboo, some three inches in diameter. Smaller bamboos are laid parallel with it every two or three feet. These are well fitted to the walls and further strengthened in place by green withes, which rapidly dry to an almost leather-like hardness.

On these rafters are laid long palm leaves, dried and intact. They are laid so as to touch each other, and are lashed to the rafters with withes similar to those mentioned. A second, third, and fourth layer are laid on the first, lapping it as is done in the case of shingles or slate. The entire mass extends beyond the plane of the walls from two to three feet, and forms a very excellent eaves. Then on these long leaves are placed shorter leaves in exactly the same manner and fastened the same way. The ridge is finished by several layers of leaves, crossing the top and extending down the front and rear slopes a foot on each side. They are held in place by the half cylinder produced by splitting a large bamboo, which in turn is lashed at either end. The roof is very strong, and will resist the attacks of both men and savages. It is also durable, and with care lasts twenty to forty years.

Another very effective and quite handsome roof is made by splitting long and large bamboos, laying the half cylinders with the concave side up till the walls are completely covered, and then laying other half cylinders with the concave side down, so that the contiguous lines of the latter meet in the bottom of the troughs of the former. The pieces are kept in place by a horizontal half cylinder at the lower edge of the roof, parallel with the house wall and further secured by bamboos running horizontally across the roof from wall to wall and lashed to the latter with strong withes. The effect is similar to that produced by red tiles of the same shape in tropical civilized lands, but is somewhat handsomer.

A third and very common style of roofing is by means of rattan, bamboo and other mattings. Some are flimsy affairs, such as used in the United States for flooring purposes. Others are far stronger and are made of rattan as thick as a pen holder and woven exactly as are the rag carpets of country housewives. The cording is usually strong hemp twine, but occasionally iron and copper wire are employed. Mats of this sort are very strong and durable and at the same time permit a free though small circulation of the air through them. They are used for walling and partitions in immense quantities as well as for roofs. When employed for the latter purpose, they permit some water to come in, unless two or three are piled together like the skirts of an Amsterdam belle.

A more waterproof kind is made by using three systems of cords in the web, and weaving two rows of rattans or bamboos so that one row fits in the interstices of the other. When good wire is employed in this kind of goods, it makes a flexible roof or wall, strong enough to resist a tiger. These mats are used generally over horizontal rafters of bamboo. Sometimes they are thrown over the low limb of a tree, and make a very comfortable tent. Sometimes, and more especially in Dyak settlements, where the people live in trees, they are stretched from bough to bough, and then brought down and fastened to a stanch platform, thus forming walls as well as roof to the ingenious inmates. In the fishermen's islands, where there is no fear of wild animals, and little or none from man, a long bamboo is tied to the trunks of two palms at a distance varying from eight to fifteen feet from the ground. Then over this, as a ridge-pole, long pieces of the matting are thrown, whose ends finally are fastened to the ground with sharpened stakes. The huge tent thus formed makes a very comfortable habitation in these tropical latitudes.

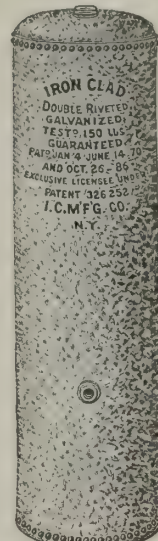
Granite in Architecture.

It may be useful to notice that in modern granite architecture, as in the true granite style of the ancient Egyptians, simplicity in design should be a *sine qua non*. Such a treatment certainly gives the most pleasing effect, and is in perfect accordance with the hard

nature of the material. Any attempt at elaboration is altogether out of place. Over-wrought granite is always painful to the sensitive eye, influenced, no doubt, by the remembrance of the vast amount of labor involved in the work. Overpolishing, too, has a peculiarly harsh and repulsive appearance, especially in the Aberdeen variety. A better and more pleasing effect may be obtained by employing a breadth of unpolished surface to heighten the value of the highly polished portions.—*Stonemason.*

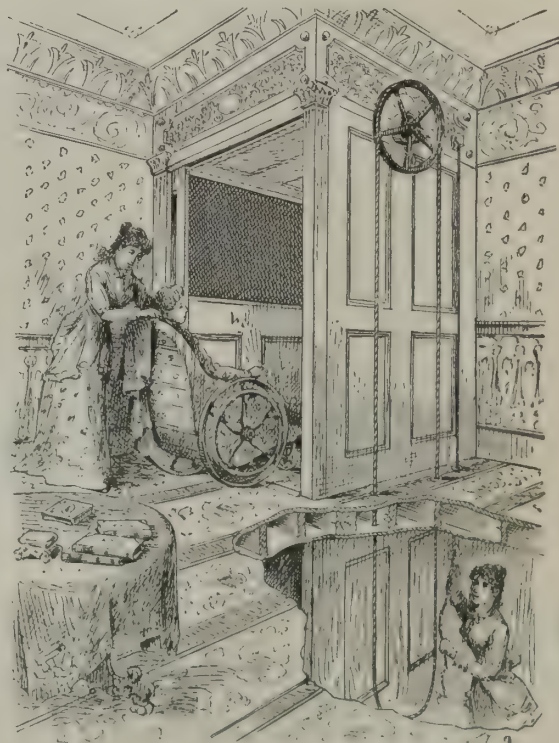
THE "IRON-CLAD" RANGE BOILER.

In the several specialties in their line the Iron-Clad Manufacturing Co., of Nos. 22 and 24 Cliff Street, New York City, have long held a leading position. They have all the advantages in manufacturing which pertain to a large and long established plant, and their goods have been on the market a sufficient period to have earned for them a high reputation. In their galvanized range boilers, shown in the picture, they make two grades, styled the "regular" and the "extra heavy," the latter being about twenty five per cent. heavier than the former, and being tested for excessive pressure. They give a very strong guarantee to plumbers setting up their boilers, whether the boilers are purchased directly or indirectly from them. The company manufacture an extensive line of galvanized sheet iron wares and other specialties.



A HELP FOR THE INFIRM.

Nothing of the many modern appliances that are being put into the new houses of to-day is a source of greater convenience and more comfort than an invalid lift, when properly constructed. Not only are they of inestimable value in a household where there are one or more invalids to go up and down stairs, but they are also of great convenience in every well equipped house, being easier and quicker than walking. The machine shown in the cut is a superior one in many respects. It is made by the Storm Manufacturing Co., Newark, N. J., and we are told that they have made hundreds of them. The cars of these machines are handsomely made, being paneled four feet high, with bronzed wire work on top of the panels. And they are made in different sizes to suit the various places where it is desirable to place them, and can be run any number of stories. They can be operated by the person on the car or by an attendant on either floor to which they go. Being operated by hand, they are not expensive, and can therefore be used in many places where power elevators



THE "INVALID LIFT."

would be impracticable. If you wish to add not only comfort but luxury to your house, you should have one of these machines.

MESSRS. BARLOW BROS., Grand Rapids, Mich., have "color cards" which are sent out free with their samples and circulars of patent manifold shipping blanks, the color card forming an ingenious device to give scope for guessing. Barlow's patent manifold shipping blanks are an excellent article of their kind and shippers find them a great convenience.

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No. 4.



A RESIDENCE AT FORDHAM HEIGHTS.

[See plate in colors, also page 30.]

Scientific American.

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A. E. BEACH.

NEW YORK, OCTOBER, 1891.

THE

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Of the October number of the ARCHITECTS AND BUILDERS EDITION OF SCIENTIFIC AMERICAN.

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SHEET IRON PLATES FOR GOTHIC ARCHES.

To the Editor of the Scientific American:

Can the Gothic arches of a church be covered with galvanized iron, in lieu of plaster, without any danger of the iron becoming a sounding board? The church is ribbed, forming a vaulted surface.

ROSSI & MANNERS, Architects,

10 Union Place, Union Hill, N. J.

Answer.—While iron is an elastic body and therefore a sonorous one, and while its vibrations from the shock of sounds would have a tendency to produce resonance, yet it must be remembered that if it does not reflect the sounds which strike its surface, no resonance will be manifested. This reflection is interfered with from the manner in which such galvanized iron plates are fastened to the ceiling. As a rule, the rows of nailings are about eighteen inches apart, and therefore are too close together to permit of any vibratory motion, and they are nailed to a wooden framework composed of many parts. This framework absorbs the sounds to some extent and does not return them. Then again galvanized iron plates for ceilings are given a heavy coat of mineral paint on their back surfaces, and this paint also tends to lessen a vibratory movement, although not put on for that purpose. Dr. Hepworth's church, corner of Madison Avenue and 45th Street, New York, was sheathed inside and out with galvanized corrugated iron. The acoustic properties of the church were excellent. The Tabernacle, a Baptist church at Albany, N. Y., has a vaulted iron ceiling, pendants, ribs and ornaments of iron. A Methodist church at Tremont, N. Y., is sheathed inside and ceiling with galvanized iron, where the method of fastening the plates can be seen.

A RESIDENCE AT FORDHAM HEIGHTS, NEW YORK.

We give as the subject of one of our colored plates this month a residence, colonial in treatment, recently erected for Mr. Clarence Smith, at Fordham Heights, New York. (See another view of same house on page 49.) The special features of the exterior are the pleasant porch at front entrance and the lookout in tower. The rooms are good sized and well arranged for light and comfort. First story is built of local bluestone, rock-faced, and laid up at random; second story is of wood. The exterior being covered with clapboards and shingles and painted colonial yellow with white trimmings. Roof shingled and painted red. Dimensions: Front 46 ft. 6 in.; side 40 ft. 6 in., not including front piazza. Height of ceilings: cellar 7 ft.; first story 9 ft. 6 in.; second 9 ft.; third 8 ft. 6 in. Hall, spacious, is trimmed with antique oak. It contains a large open fireplace built of brick with hearth laid with same and mantel shelf of oak. The staircase is separated from main hall, the posts of which extend to ceiling. Between these posts are spindle transoms, supported on ornamental brackets. Parlor is finished in china white, with a little gilt, and is provided with an open fireplace, furnished with a tiled hearth and facings and a mantel of exquisite design. Library, trimmed with cherry, is furnished with book cases built in flush with wall, thus avoiding the necessity of projecting into room. Dining room is trimmed with oak. It contains a fireplace with hearth and mantel. Floors throughout of hard wood. Kitchen and its apartments are trimmed and wainscoted with Georgia prime and finished natural. These apartments are fitted up in the best manner. Second floor contains four large bedrooms, closets, den and bathroom, the latter wainscoted with white English tiles and fitted replete. Billiard room and one bedroom on third floor. Cemented cellar under whole of house contains laundry and furnace, also other necessary apartments. Cost, \$9,000 complete. Messrs. Walgrove & Crails, of New York, architects. The engravings were made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

A COTTAGE OF MODERATE COST.

In this issue we give a plate in colors of Miss Fryet's residence at West Brooklyn, N. Y. The view is from a photograph specially taken for the SCIENTIFIC AMERICAN. The piazza extends across the front of the cottage, part way down either side, affording excellent facilities for shade during the hot weather. The size of the parlor is 12 ft. 6 in. X 15 ft., and is connected to the library by sliding doors. Thus these two rooms, if furnished somewhat alike, could practically be thrown into one room. The fireplaces for these rooms are in the angle. The drawing room is direct at the end of the hall, and is 12 ft. 6 in. X 13. This room is connected with the dining room by sliding doors. The kitchen is 11 X 11 ft. and is supplied with a good closet. The back entrance is convenient. On the upper floor are four good bed rooms and a toilet room, the servants' room is at the head of the back staircase. There is no water closet inside the house, but an earth closet at the end of the lot. The foundations are of brick first story clapboards and the remainder of the house frame construction, covered with shingle. The cost of the house is about \$3,000, according to the locality.

COTTAGE AT SPRINGFIELD, MASS.

We illustrate on page 51 a cottage at Springfield, Mass., built for J. D. McKnight, Esq., at a cost of \$3,600. This is a very pretty cottage and has a pleasant porch and veranda. The underpinning is of local brick and the exterior is covered with clapboarding and shingles, and the whole being painted red with trimmings of a darker shade. Although this is not a large house, the accommodations are generous, owing to the compact and convenient arrangement of the rooms. A square hall at side, connected to parlor by double sliding doors, is finished in oak and contains an attractive staircase; the parlor is finished in sycamore and contains an open fireplace with hearth and facings of rich tiles and a handsome hardwood mantel. The dining room is in oak and is connected to parlor by sliding doors. The passage under staircase is furnished with a wash bowl cased and supplied. The kitchen is wainscoted with narrow beaded stuff and is provided with a sink neatly cased and supplied, and a fireplace fitted up with a range, besides two large pantries provided with shelves, drawers, and cupboards, and also ice box. The second floor contains four good sized and well lighted bed rooms, with closets that are well fitted up, etc. The bath room is wainscoted and contains bath tub, wash bowl and water closet, all cased and supplied in the best possible manner. There are three rooms and trunk room in the attic. There is a cemented cellar under whole of house, with laundry and furnace. The house is provided with gas and speaking tubes.

Our engraving was made direct from photograph taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT BRIDGEPORT, CONN.

Our plates on page 52 illustrate the residence of Mrs. James L. Harlem, Bridgeport, Conn. This beautiful modern house is located on the corner of Fairfield Avenue and Hancock Avenue, Bridgeport, Conn. The exterior is well studied, presenting very pleasing appearance from any point of view. It is a frame house, and is very well built. The roof is slated with black and green slate. The sash are filled with plate glass. The first story contains vestibule and entrance hall, large staircase hall, reception room, parlor, sitting room and dining room, conservatory, kitchen, pantries, etc. The hall and staircase are of quartered oak, the hall having a paneled wainscot and oak floor. The rest of the rooms are finished in poplar or white-wood, stained to imitate cherry and antique oak. The hall is a beautiful room, and finely lighted by a large plate and stained glass window. In the front of the parlor is a large round head plate and stained glass window, a beautiful feature outside and inside. In the second story are five chambers, large square front hall, rear hall, bath room, etc. A pleasant balcony over front entrance opens from hall. The second story is finished in stained whitewood. In the third story are two finished rooms and attic. The cost of the house complete is about \$7,500. The architect is Joseph W. Northrop, Bridgeport, Conn. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT FORDHAM HEIGHTS.

We publish on page 53 a suburban cottage erected for Mrs. L. Cadwell, at Fordham Heights, N. Y. Dimensions: Front, 32 ft. 6 in.; side 49 ft., not including porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. Underpinning of local stone. Exterior clapboarded and painted light olive green with bottle green trimming. Gables shingled and painted red. Blinds painted "bronze" green. Roof slated. The plan is a unique model of coziness, and it contains spacious rooms that are well arranged for light and comfort. A shady porch at front. The staircase, of handsome design and lighted by stained glass windows, is the feature of the hall, while the parlor and dining room have open fireplaces, furnished with tiled hearths and facings and hard wood mantels with beveled plate mirrors, etc. These apartments are trimmed with natural cherry. The door and window casings throughout are beaded and turned sunk angle blocks are at corners. Floors of hard wood. Butler's closet, of good size, is well fitted up with bowl, drawers and closets. Kitchen is trimmed and wainscoted with North Carolina pine and provided with sink, wash trays, closet, range, etc. Second floor contains four bed rooms and bath room, all trimmed with antique oak. Bath room is wainscoted and fitted up in the usual manner. Fireplaces are fitted up similar to ones on first floor. There are two bed rooms and trunk room on third floor. Cemented cellar contains furnace. Cost \$6,000 complete. Mr. Milton See architect, New York. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

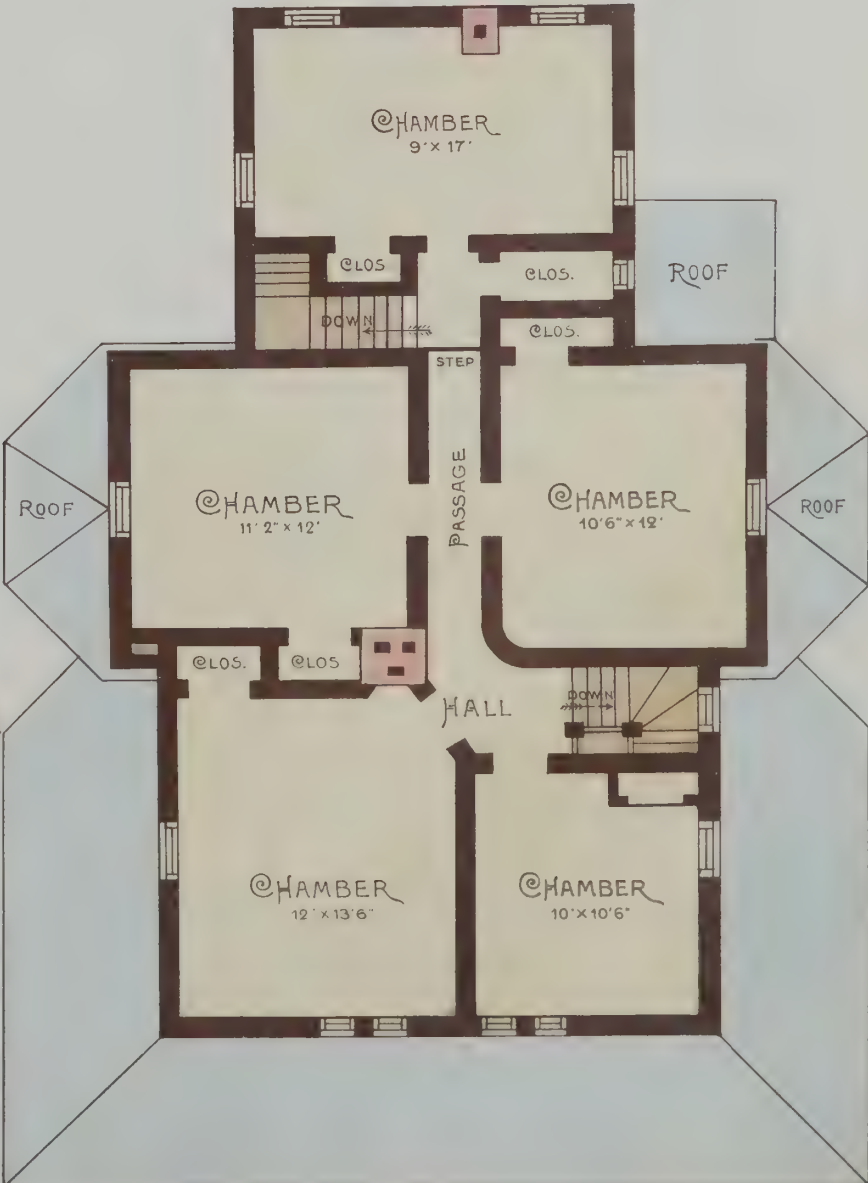
AMOS J. BICKNELL, aged 52 years, died at his residence, Elizabeth, N. J., on the 21st of September. He was vice-president of the Elizabeth Board of Trade and publisher of the *Architectural and Building Monthly*, of this city.



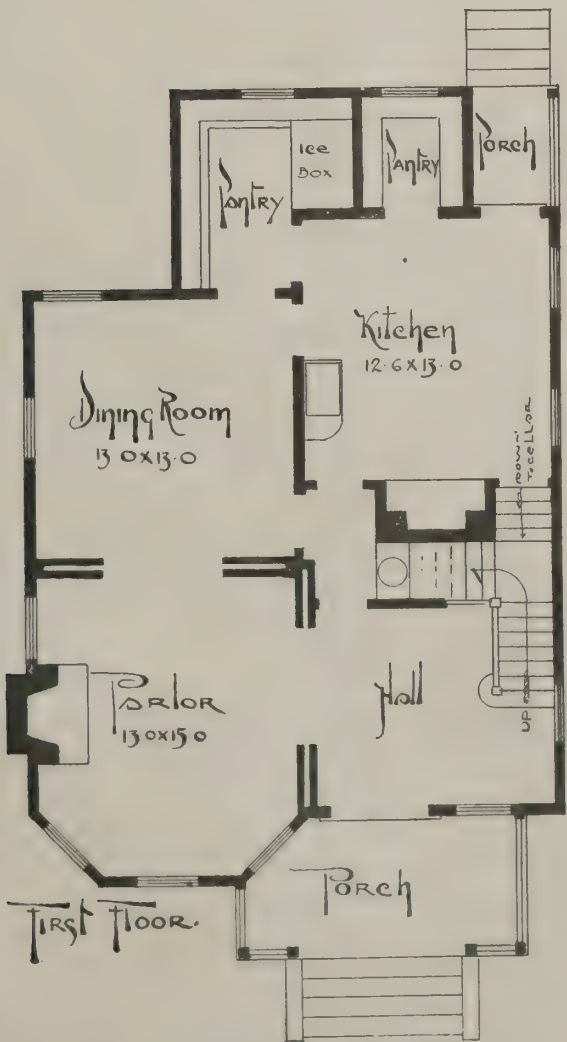
A COTTAGE OF MODERATE COST.



First-Story-Plan.

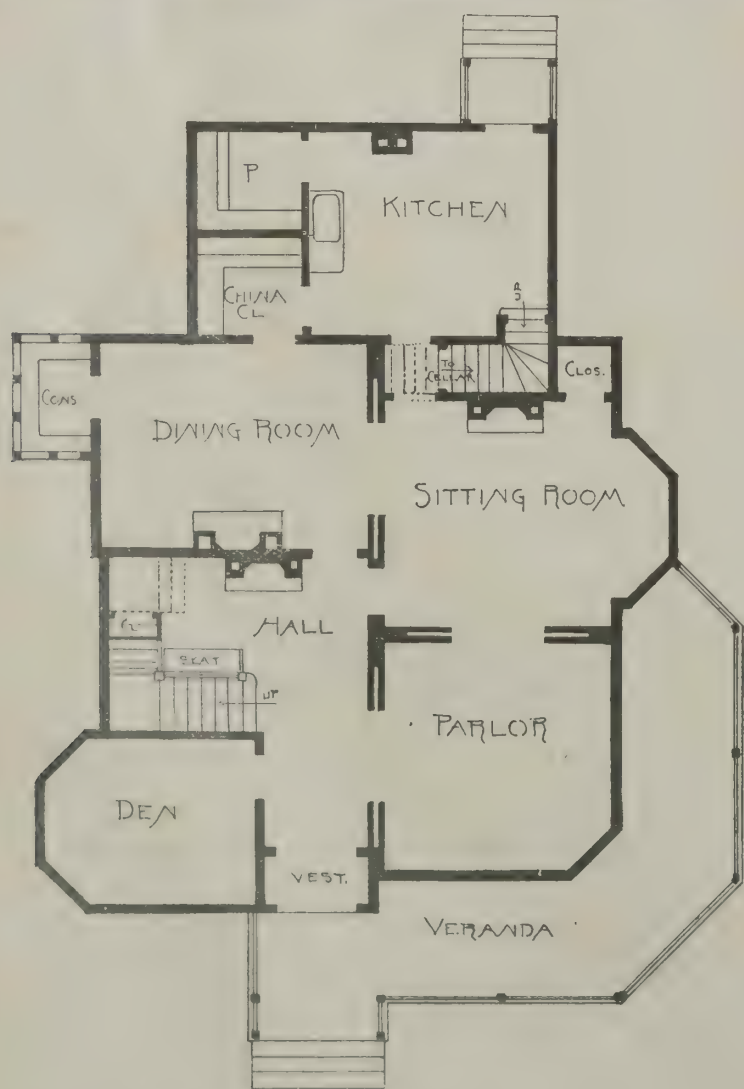


Second-Story-Plan.

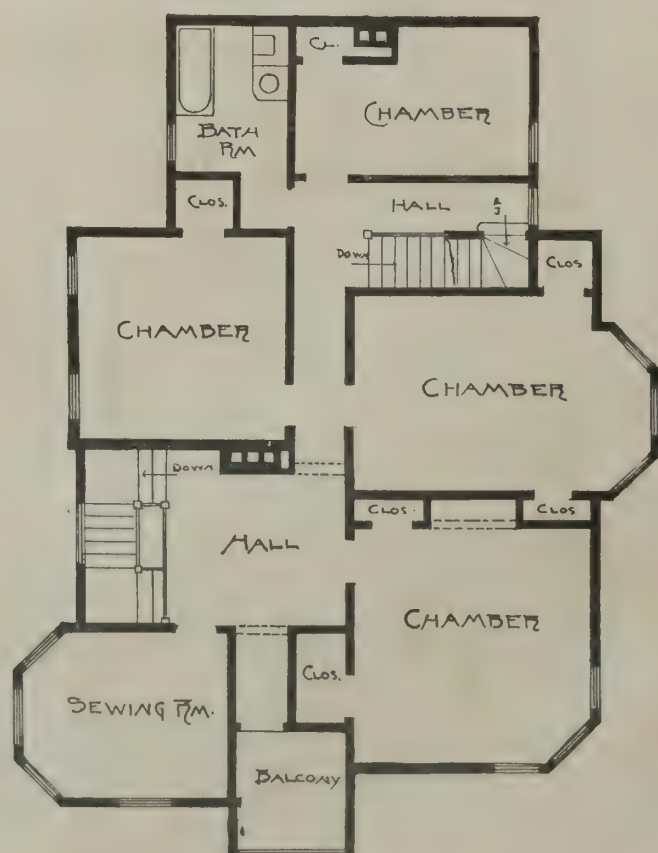


[See page 50.]

COTTAGE AT SPRINGFIELD, MASS.



FIRST FLOOR PLAN



SECOND FLOOR

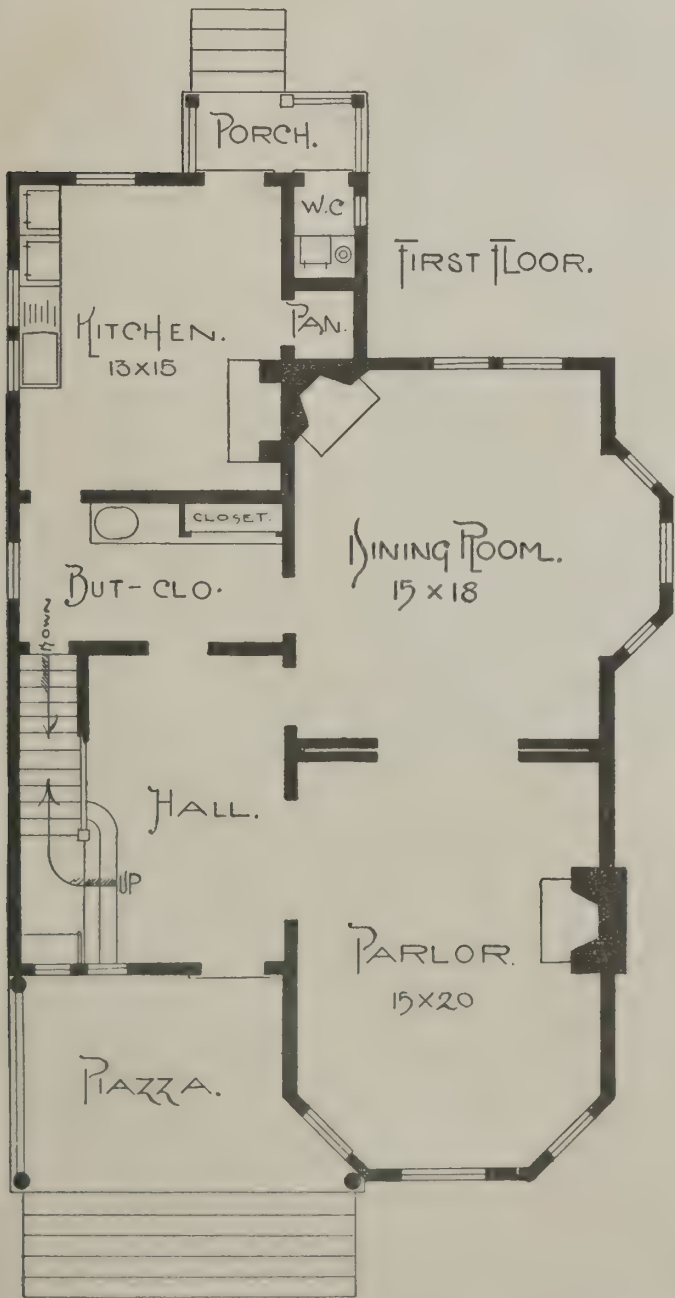
[See page 50.]

A RESIDENCE AT BRIDGEPORT, CONN.



A RESIDENCE, FORDHAM HEIGHTS, N.Y.





[See page 50.]

COTTAGE AT FORDHAM HEIGHTS.

THE LUCAS BUILDING.

This unique building, recently erected at Juniper and Chestnut Streets, Philadelphia, Pa., by the late J. C. Lucas, is a seven-story structure, 120 feet high. It is one of the handsomest buildings in the city, and reflects much credit upon the architect, Mr. Willis G. Hale.

The lot has a frontage of 32 6 feet on Chestnut Street, and extends back 230 feet to Sansom Street. The distance from the ground to the top of the tower is 120 feet. The front of the building is highly ornamental. The material of the base is polished New Brunswick granite. The entrance arch on Chestnut Street is 13 feet wide and 21 feet high. There is no entrance on Juniper Street. That side of the building is of brick and red granite, and is very attractive. The ornamental terra cotta work adds much to the pleasing effect of the design. The building is thoroughly fireproof. On the first floor to the left of the entrance is the stair tower, inclosing two hydraulic elevators. These afford an easy access to every part of the building. East of the entrance there is a room for the exclusive use of ladies having accounts at the bank. The banking room in the rear of the vestibule is 29 feet wide and 94 feet deep. The floor is tiled, and wainscoted with marble to the height of 7 feet. The walls above the wainscoting are handsomely decorated. A wide frieze of marble plaster extends around the room.

We are indebted to the *Architectural Era* for the above particulars as well as for our engraving.

DWELLING AT LONGWOOD, MASS.

Our engraving, page 55, presents a design of very substantial construction and a roomy interior erected for Mr. W. B. Tyler, at Longwood, Mass. Dimensions: Front, 31 feet; width, 49 feet 6 inches, exclusive of piazza and porch. Height of ceilings: Cellar, 7 feet; first story, 10 feet; second, 9 feet; third, 8 feet. Underpinning built of Chestnut Hill stone, laid rock-faced ashlar; the building above this is of wood, covered with shingles, stained sienna. Roof shingled and painted red. Hall and staircase hall are trimmed with oak, the former having a "Dutch" door, paneled divan and stained glass windows, and the latter an ornamental staircase, the posts of which extend to the ceiling. Between these posts are carved brackets forming Gothic arches. Parlor is trimmed with cherry and dining room with oak, and each is provided with fireplaces furnished with tiled hearths and hardwood mantels. The dining room, provided with a paneled wainscoting, ribbed ceiling, buffet, and divans, carries out the colonial effect so successfully sought. The back hall and staircase are conveniently located and form access to kitchen from front hall. Pantries are of sufficient size to contain the usual fixtures, dressers, closets, are well lighted and convenient. Kitchen is wainscoted and trimmed with yellow pine finished natural with hard oil. There are five bed rooms and bath room on second floor and three bed rooms on third floor. These apartments are trimmed with whitewood, finished natural. Bath room is wainscoted and fitted up complete. Cemented cellar under whole of house contains laundry, furnace and other apartments. Cost \$6,423 complete. Hartwell & Richardson, Boston, Mass., architects. Our engraving was made direct from a photograph of the building taken specially for the *SCIENTIFIC AMERICAN*.

A NEW ROCHELLE VILLA.

We give on page 56 a villa recently erected for D. L. Dowd, Esq., at Rochelle Park, New Rochelle, N. Y., from plans prepared by the proprietor. The design is of a very substantial construction and a roomy interior. A wide piazza (8 ft.) extends around the four sides of house. Foundation stone. First story clayboarded and painted chrome yellow with dark brown trimmings; second story shingled and painted in various shades of yellow. Roof shingled and painted red. The interior throughout is trimmed with whitewood stained and finished in cherry. Hall, 7 ft. wide, contains an ornamental staircase, turned out of Georgia pine, beneath which the stairs to cellar descend. Communication to parlor and library are obtained by double sliding doors. These apartments and dining room have open fireplaces, furnished with tiled hearths and hard wood

mantels. Butler's pantry is provided with cupboards, drawers, bowl and ice box with outside entrance thereto. Kitchen and pantry are wainscoted and trimmed with North Carolina pine finished with hard oil. These apartments are replete in their various appointments. Servants' stairs from kitchen have their private landing on second floor, from which the stairs to attic ascend. All the floors throughout are laid with Georgia pine and oiled. Second floor contains four bed rooms and bath room, the latter wainscoted and fitted up complete. One room in attic besides storage. Cemented cellar contains laundry, furnace, etc. Cost \$7,800 complete. Our engraving was made direct from a photograph of the building taken specially for the *SCIENTIFIC AMERICAN*.

CARRIAGE HOUSE AND STABLE.

We present on page 57 a stable erected for Mr.



THE LUCAS BUILDING, PHILADELPHIA.

Charles A. Moore at "Belle Haven," Greenwich, Conn. The design is excellent; the answering lines in roof together with dormer windows and cupola give it a good appearance, while the interior is equally as satisfactory, owing to its convenient arrangement and the number of square feet of floor space, making it one of the most desirable types to construct. Size, 31 x 54 ft., exclusive of the covered way at front. The exterior framework is sheathed, clapboarded and painted colonial yellow with ivory white trimmings. Roof shingled. The walls and ceilings throughout the interior are ceiled with narrow beaded yellow pine, finished natural with hard oil. Carriage room, 30 x 35 ft., is well lighted and provided with carriage wash, harness closets with sliding glass doors, closet, and stairs leading to second floor. Stable, 17 ft. 6 in. x 30 ft., contains five stalls as per plan, fitted up in the best possible manner with the usual ornamental iron furnishings. Second floor contains one bed room and large storage room. Estimated cost, \$2,200. Boring, Tilton & Mellen architects, New York.

A COTTAGE IN ROSALIE COURT, CHICAGO.

We publish on page 59 a photographic view taken especially for the *SCIENTIFIC AMERICAN*, also two floor plans, of the above cottage, No. 5938 Rosalie Court. S. Bernan, architect. The house is of frame construction throughout and is celled throughout. A veranda extends half way across the front, and the main entrance is off same; the hall being in the center of the building, with the parlor on the left of same. The room measures 14 ft. 6 in. x 16 and has large bay window the full width of the room looking on to the side lawn. There is a door of communication from it to the dining room, which is 10 ft. x 13 ft. 6 in. and is situated immediately behind the parlor, with angle fireplace, mullioned window and entrance direct on to main hall. The library is on the opposite side of the hall to the parlor and is lighted from both front and side. The kitchen is 11 ft. 9 in. x 13 ft. 6 in. and contains every modern convenience, also pantry adjoining and opens on to rear porch. There are five chambers on the second floor, all having excellent closet accommodation. The house is nicely sheltered by foliage and very picturesquely situated. The estimated cost of this house is \$3,600.

A ROW OF PHILADELPHIA HOUSES.

We present on page 60 a plate in perspective, from a photograph, taken specially for the *SCIENTIFIC AMERICAN*; also plans showing corner house only, as the other houses are facsimile of this one. Dimensions: Front, 18 ft.; side, 64 ft. 6 in., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. 6 in. Underpinning of rock-faced bluestone and the superstructure of Philadelphia pressed brick. Roof covered with Bangor slate. Hall trimmed with ash contains an ornamental staircase turned out of similar wood. Parlor and dining room trimmed with cherry and separated by sliding doors. Parlor fireplace is provided with tiled hearth and hardwood mantel. Other fireplaces, where shown, are furnished similar. Kitchen, pantries, and laundry are trimmed and wainscoted with ash and fitted up complete. The rest of the house is trimmed with ash, finished natural. Second floor contains library, two bedrooms, and bathroom, and the third floor five bed rooms. The attic over this is left open, but rooms could be finished off if desired. Cemented cellar contains furnace and other apartments. Corner house cost \$7,500 and the inside houses cost \$5,800 apiece. W. D. Hewitt, Philadelphia, architect.

A CARRIAGE HOUSE.

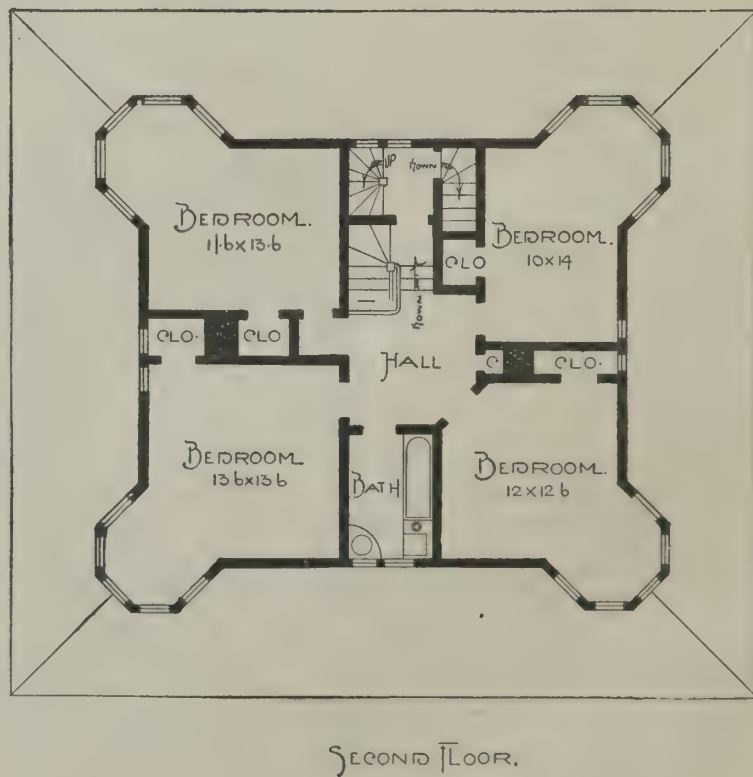
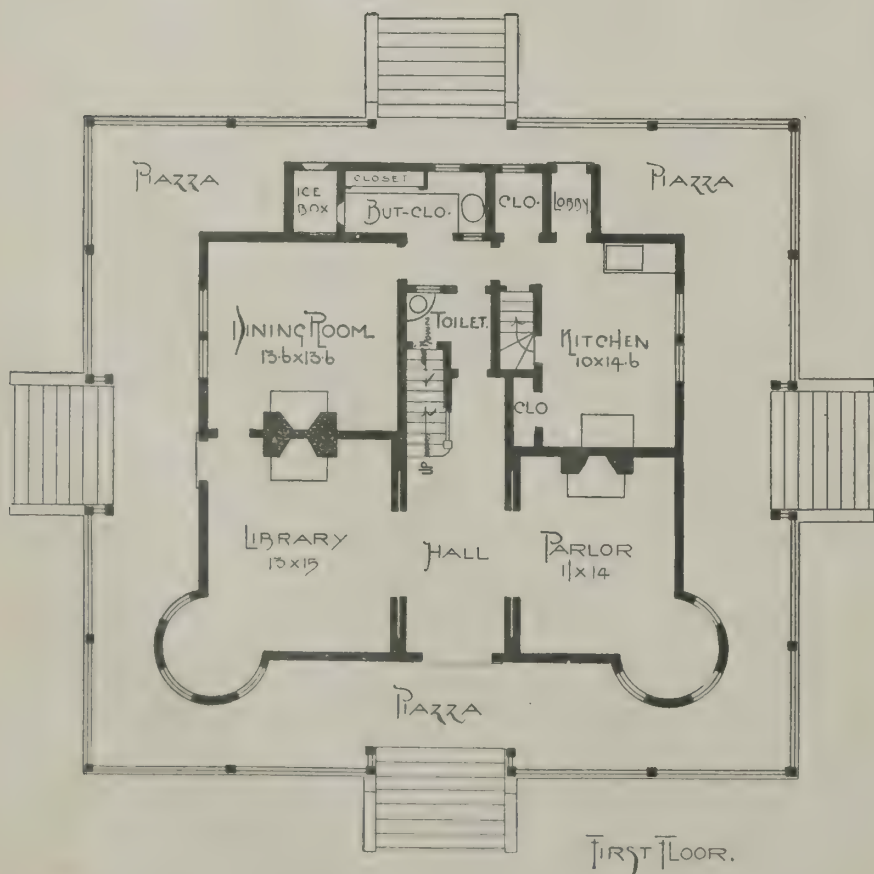
We present on page 62 an engraving showing a carriage house erected for Samuel Clark, Esq., at Newark, New Jersey. Size 24 x 42 ft., exclusive of tower. The foundation is of stone with underpinning of brick, laid in red mortar. The stonework at tower and chimney is built of red sandstone, rock-faced, and laid up at random. The exterior above this is of wood, clapboarded and painted bottle green. Roof slated. The ground plan which accompanies the engraving shows a large carriage room, 23 x 23 ft., and a stable 17 ft. 6 in. x 23 ft. The carriage room is provided with carriage wash, harness closets, etc. Stable is well

lighted and ventilated, and contains ten stalls and box stall, fitted with the usual ornamental iron furnishings. The walls and ceilings throughout the interior are ceiled with yellow pine finished natural with hard oil. Second floor contains living room and two bed rooms for man servant, bowling alley and loft. Bowling alley is fitted up complete and has its private stairs at rear of building. Cost \$3,300 complete. This stable could be erected for much less by not finishing the second floor. Mr. A. M. Stuckert, Denver, Colorado, architect. Our engraving was made direct from a photograph of the building taken specially for the *SCIENTIFIC AMERICAN*.

A GOOD recipe for renovating carpets, to restore the colors and remove stains. First beat the carpets thoroughly. Then after they are tacked down, wash them with warm solution of one part ox gall to twenty-five parts water by measure. Mix and use a little of the solution at a time, so as to have it always warm and clean.

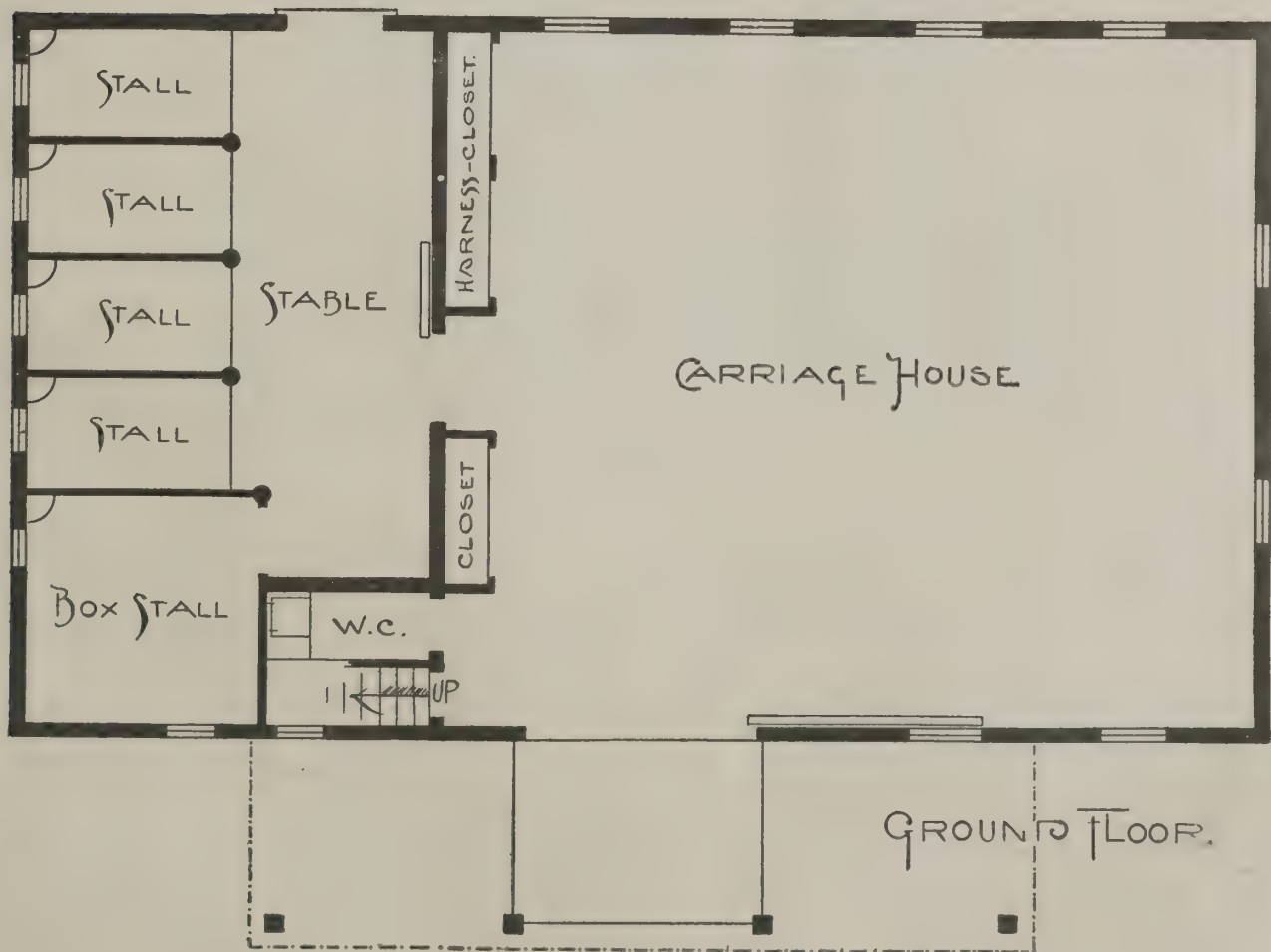


DWELLING AT LONGWOOD, MASS.



[See page 54.

A NEW ROCHELLE VILLA



[See page 54.]

A CARRIAGE HOUSE AND STABLE.

THE MASONIC TEMPLE, CHICAGO.

The Masonic Temple, which is now in an advanced stage of completion, is on the corner of State and Randolph streets, and is the work of Messrs. Burnham & Root, architects. *Engineering* gives the following particulars: The building extends 170 feet on State street to a 40 foot alley and 113 feet on Randolph street to a 25 foot alley. The height from the sidewalk to top of coping is 274 feet. It has no fewer than twenty stories, and contains 5,436,000 cubic feet in building, exclusive of the inner court. The street fronts are of dressed granite up to the sills of the fourth story windows; above that, of terra cotta and brick of a gray and mottled color to match the granite.

The foundation arrangements of this vast building consist of a large number of independent platforms, the sizes of which are regulated so as to give an equal load on each; these platforms are made of timbers laid close together, and supporting double rows of steel rails and T girders, upon the top of which the base-plates for the columns are placed.

The first ten stories are to be devoted to shops accessible from a foot balcony 10 ft. wide continuing around the inner court and provided with shop windows for display of goods. The eleventh to sixteenth stories inclusive are to be used for offices; the seventeenth, and thence to the top, are for masonic purposes. Masons will have four halls 50 ft. by 111 ft., besides banqueting halls, lodge, chapter, commandery and consistory rooms, etc. Fourteen passenger elevators are arranged in a circular curve at rear of the main entrance. There are also two freight elevators. All the balconies have floors and soffits of marble and mosaic; the columns showing in court are covered with alabaster; all the interior metal is of bronze finish highly ornamented. The inside court is to be lined with marble throughout. On the roof there is a promenade 100 ft. by 120 ft., covered with a skylight and inclosed with glass. The interior court is continued up through this. To furnish light, heat and ventilation, a battery of seven 150 horse power boilers are provided.

All the piers have steel columns inside, which carry the floor loads. With the exception of six piers, the whole building above the fourth floor is carried on the columns, and these six only carry their own weight. A 25 ton girder 43 ft. long runs over entrance at the fourth floor to take the load of the arch, this being done to prevent damage by any possible inequality in settlement. Two systems of vertical bracing run through the narrow way of the building from top to bottom, one each side of the elevators. These rods run through two floors and cross one column. In the Chicago Hotel, now nearly completed, which is similar in construction, and in which this system of bracing was used for the first time, it was found that these rods are of very great value in stiffening the building. The columns are made in two-story lengths, and adjoining columns break joints at alternate stories. The center is occupied by the semicircle of fourteen elevators, which run from the ground floor to the summit, the landings being large and convenient. The staircases, which are almost unnecessary, though they are still retained, are in front of the elevators, and beyond is a wide corridor and vestibule extending to the front of the building. The rest of the floor is divided into shops, of which no less than thirteen are arranged for on each floor. On each side of the semicircle of elevators is a freight elevator for serving the shops on the various floors. The stairways and elevators here give on to an open court leading in front to a large masonic room, and on the right and left to a vast range of lavatories and to the barbers' shops.

The ironwork is contracted to be done September 1, 1891, and the entire building completed and ready for use May 1, 1892. Five weeks after the contracts were signed, the foundations, using 700 tons of rails and beams, and about 4,500 cubic yards of concrete, were entirely completed, and most of the basement columns were set in place. Two cars of granite from quarries in Maine were also on the ground at this time. The late Mr. Root designed the exterior of the building. Mr. Burnham designed the interior arrangement. E.

C. Shankland, M. Am. Soc. C. E., engineer of construction to Burnham & Root, designed the ironwork; Mr. George B. Whitney, who superintended the erection of the Rookery and Home Insurance in this city, and the Society for Savings in Cleveland, is superintendent; Messrs. A. Gottlieb & Co. are contractors for the ironwork; Messrs. Estrada, Kenyon & Gray, of Pittsburg, Pa., who inspect all the ironwork used in the firm's buildings, are inspectors of both mill and shop work.

The entire drainage is carried through the building by a system of vertical risers, about one-half of which connect directly to the street mains by piping suspended at the ceiling in basement. The remainder of the risers connect by a system of underground piping with two 50 gallon Shone ejectors located in a pit underneath the center of the building from which the sewage is forced to the street sewer. This is necessitated, as it is desired to keep the café portion of the basement entirely free from pipes, and as the basement floor is about 2 ft. 6 in. below street sewers. All drainage from

of such service being out of duty at all times, so that any accident can in no way interfere with the operation of the plant; but in case of emergency, such as fire in neighboring buildings, their capacity may be increased above the stated amount and the pumps used with great efficacy. The pumps are all operated by automatic governors, keeping a uniform head on tanks without attention.

For the lighting of the building there are distributed throughout it about 7,000 16-candle power incandescent electric lamps. These are operated by a plant of six dynamos having each a capacity of 1,000 lights.

For heating of the building are required about 40,000 square feet of radiator surface, all of which is direct radiation. Steam is supplied upon the "overhead" system. A 16 in. main supply runs directly to the attic and there branches, running around outside walls, and is tapped off for connection to descending risers which supply radiators. The water of condensation runs down these distributing risers, and returns to a receiving tank located under the basement floor, and from this is pumped to the boilers. So far as is possible all exhaust steam is used in heating, and what steam is taken direct from the boilers is reduced in pressure. The exhaust steam passes first through a feed water heater and from this to the open air in summer and to the heating system in cold weather. For the power and heat required, there is provided a battery of eight horizontal tubular boilers having in the aggregate a nominal rating of 1,000 horse power; this amount being, as in other cases, sufficient to render absolute immunity from danger of any accident requiring the stoppage of any one part of the plant.

A DWELLING AT NEWARK.

Our engraving, page 61, presents a dwelling recently completed for John E. Rowe, Esq., at Newark, N. J. The design is of the colonial style, with an interior arrangement complete. Underpinning of red sandstone, hard rock-faced. The exterior above this is covered with clapboarding with the exception of the gables, tower and balustrade to piazza, which are shingled. All painted colonial yellow, with white trimmings. Roof slated. Dimensions: Front, 41'; side, 54', not including front piazza. Height of ceilings: cellar 7'; first story 10'; second 9'; third 8' 6". Vestibule has a tiled floor. Hall, spacious, is trimmed with oak. It has a paneled wainscoting and ribbed ceiling. The staircase is an ornamental one with carved newels and it is well lighted by stained glass windows on main landing. Beneath this staircase, a toilet is fitted up replete. Fireplace built of brick has a hearth laid of same, and mantel shelf of oak. The floors in hall, library and dining room are laid of oak and highly polished. Drawing room trimmed with mahogany, library and dining room with oak: each has open fireplaces furnished with tiled hearths and facings and hard wood mantels of exquisite design to correspond with the trim of each room respectively. Library

has a window seat, and dining room is provided with china closets in either corner. Kitchen is trimmed with yellow pine, finished natural with hard oil; it is provided with well furnished pantries, range, sink, bowl, stairs to cellar, and second floor and lobby, large enough to admit ice box. Second floor contains five bed rooms, large closets, dressing room, and bath room. These apartments are trimmed with whitewood and stained cherry, except two bedrooms which are painted china white. Five bedrooms on third floor, trimmed with white pine and finished natural. Cemented cellar contains laundry, furnace and other apartments. Cost \$9,000 complete. Mr. Thomas Cressey, Newark, N. J., architect. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

To make artificial ivory that will not dissolve in water, mix eight parts shellac with thirty-two parts strong ammonia and agitate for some hours in a closed vessel. After solution mix with it forty parts zinc oxide in a paint mill. Expel ammonia by heating, dry, grind, and press into shape at a temperature of 500° to 540° Fah.



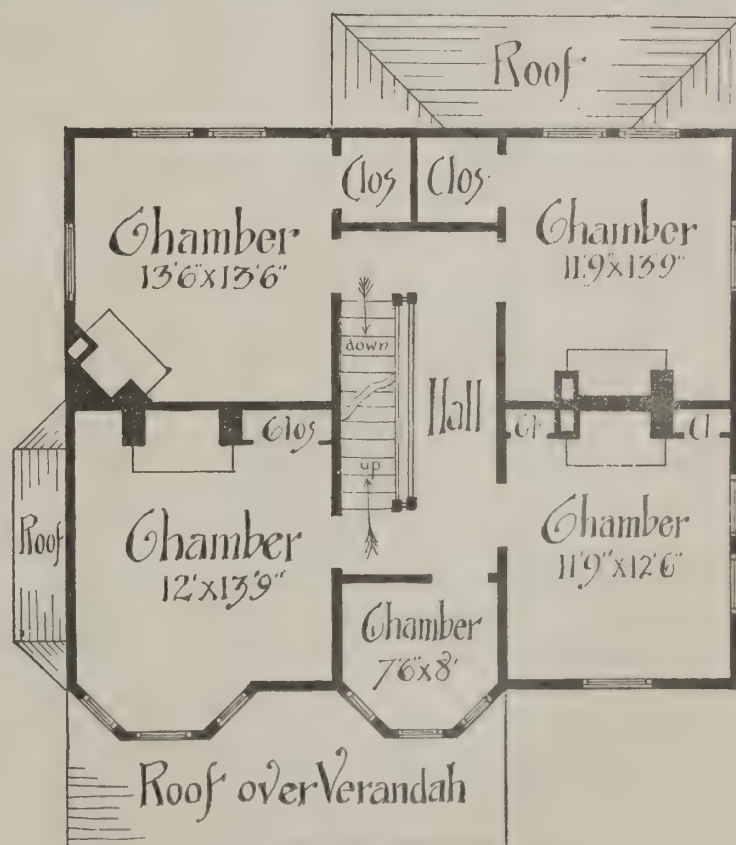
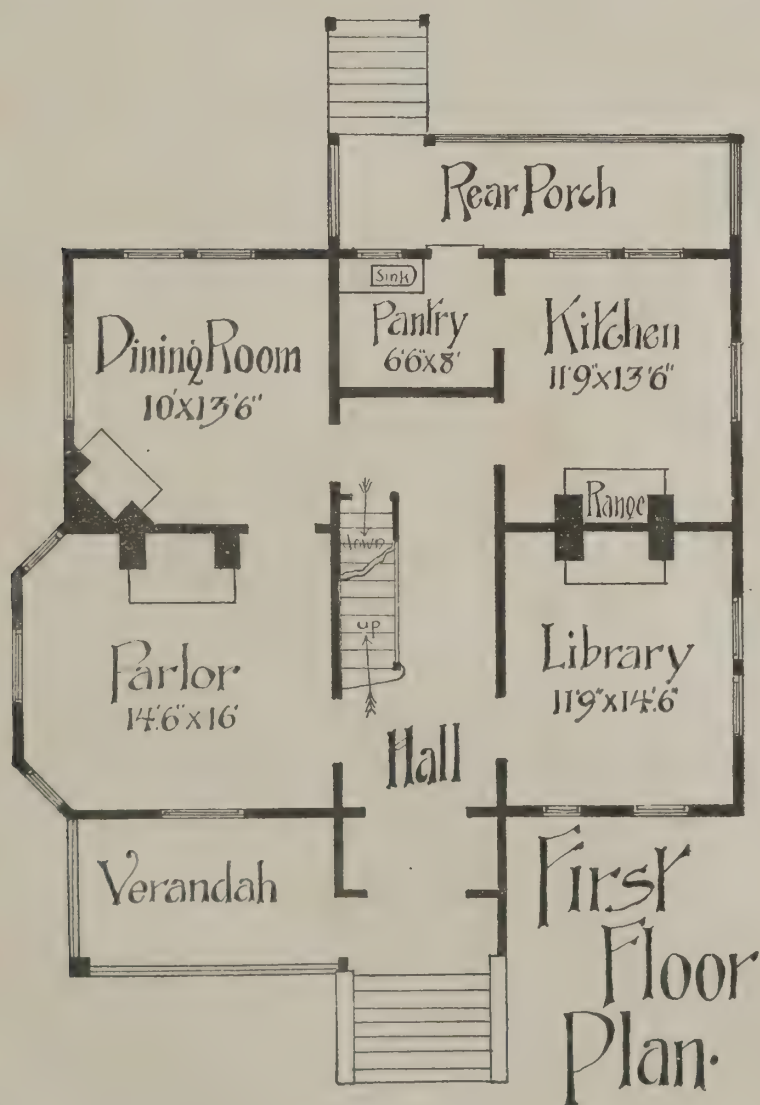
THE MASONIC TEMPLE, CHICAGO.

the boiler room and other parts of basement is therefore also carried to the ejectors.

Each office and store of building is supplied with a wash basin provided with running water. The general toilet room of building containing sixty-four closets is located upon the nineteenth floor, where is also a large barber shop. There are also toilet rooms in basement, and on third and twelfth floors, and these contain from eight to eighteen closets as well as numerous basins.

All vertical pipes in buildings, both for water supply and drainage, are carried in pipe spaces left for same. The piping throughout is of wrought iron with screw joints and fittings. The water supply of building is pumped from the city supply by pumps in the basement to two tanks in the attic, having a combined capacity of 7,000 gallons, and from these tanks is carried throughout the building. In the attic are also located four compression elevator tanks having a total capacity of 18,500 gallons. For elevator service and water supply service seven pumps are required, having a total capacity of from 2,000 to 3,800 gallons of water per minute.

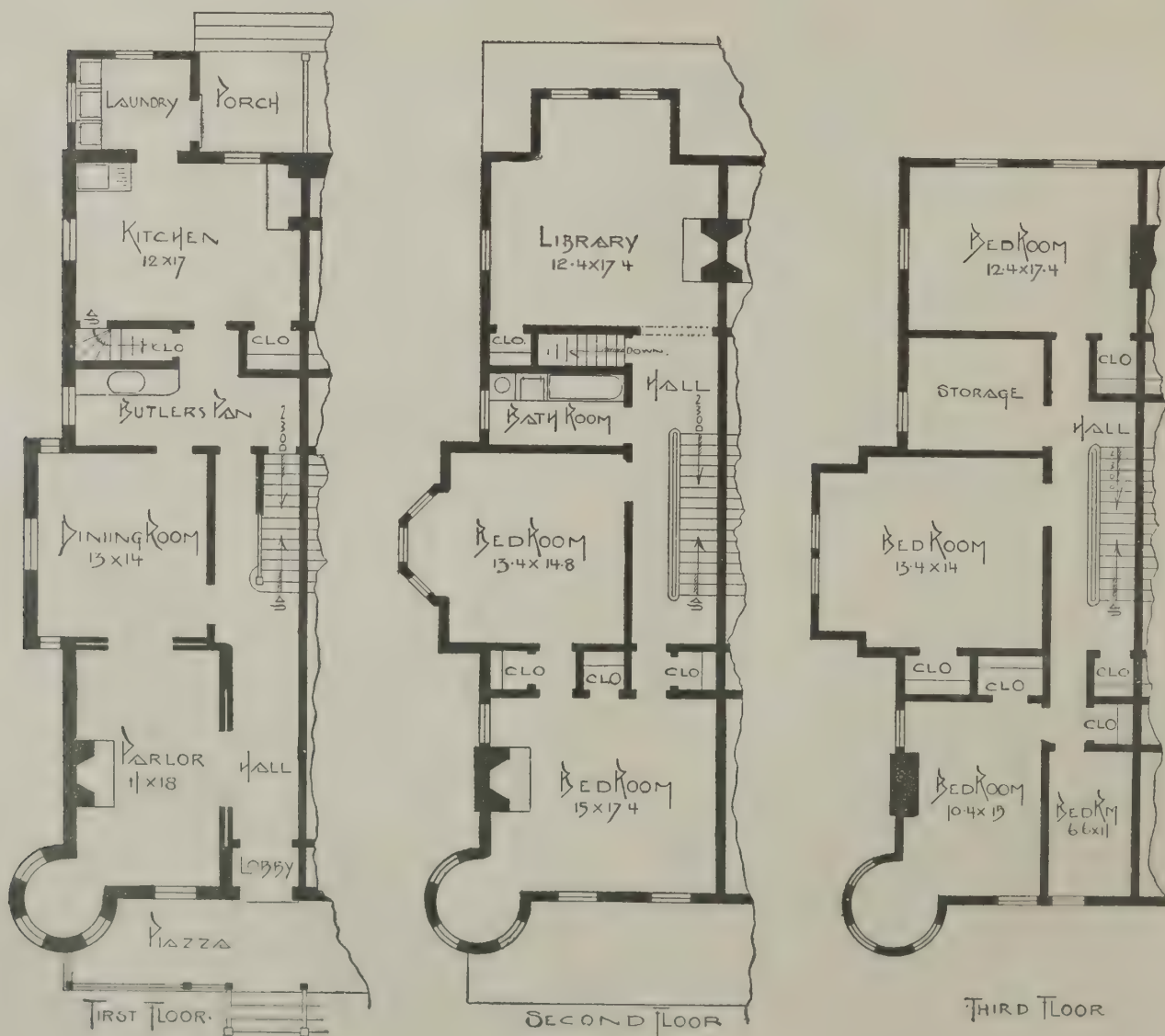
This capacity, however, admits of at least one pump



Cottage, Rosalie Court, Chicago.

[See page 54.]

COTTAGE IN ROSALIE COURT, CHICAGO.



[See page 54.]

A ROW OF PHILADELPHIA HOUSES.



[See page 58.]

RESIDENCE AT NEWARK, N. J.



A CARRIAGE HOUSE.—[See page 54.]



A GATEWAY AT NEWPORT, R. I.

Proportion.

The whole secret of design in architecture may be summed up in the terms proportion and expression, for the differences which mark off one style from another are those mainly derived from the form and proportion of the openings. Professor Banister Fletcher, in his opening address to students of architecture at King's College, very appropriately alluded to the subject of proportion, which he illustrated by taking the openings of Somerset House, and by showing by model the effect of first a doorway of half its width in height, next making it a square opening, then adding one-third of the width to the height, and, lastly, making the height twice the width.

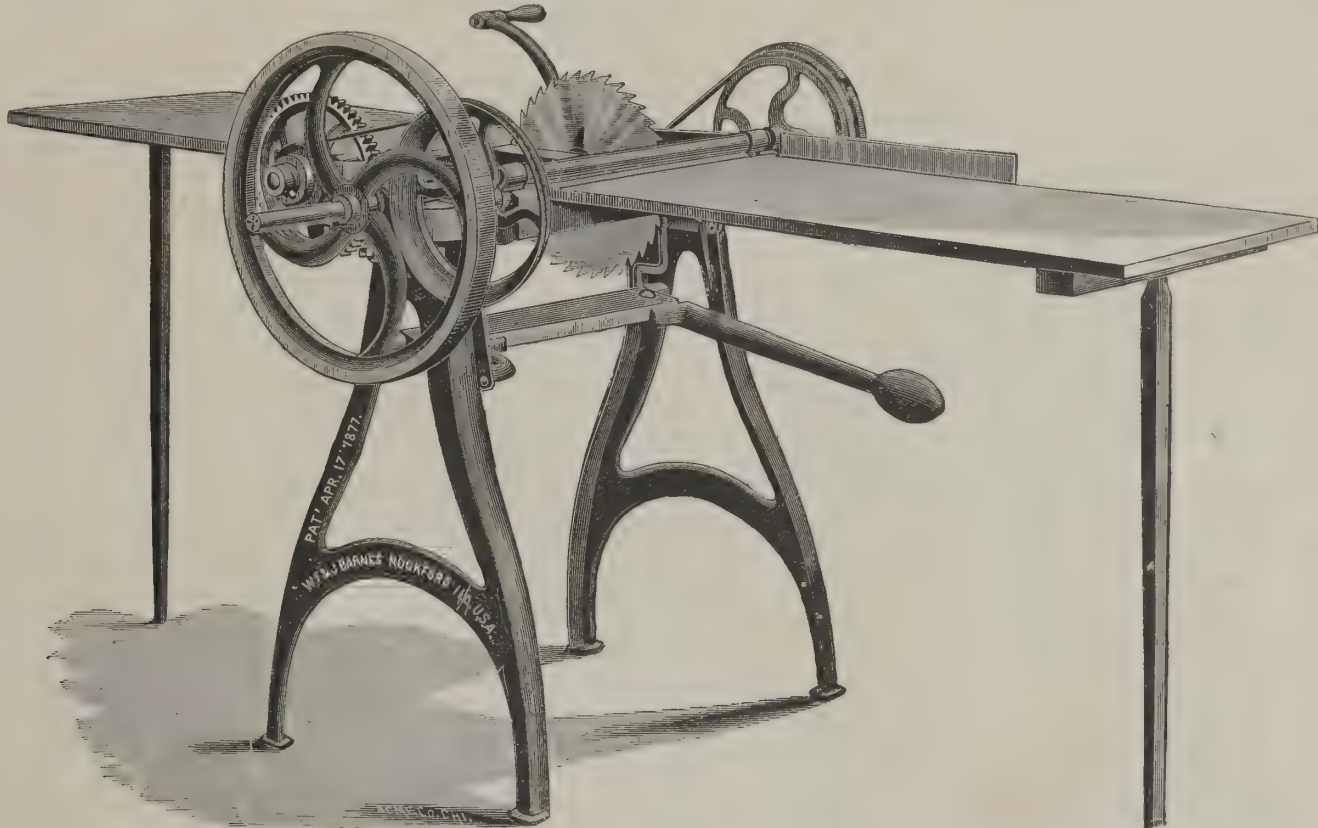
Though the low opening may be really high enough for a doorway, the mind, naturally reverting to the human figure as a standard of proportion, or to the "fitness" of things, at once condemns the proportion as bad for a doorway. We sometimes, it is true, see wide entrances to the pits of theaters, drill halls, and warehouses; but they invariably look out of proportion—that is, they appear awkward and offensive to our sense of fitness. Even in some Queen Anne houses we have seen doors of about a square, which looks contrary our standard, because we naturally recall to the mind the human proportions; though, as a matter of actual use, the wide opening may be an advantage in getting in or out large pieces of furniture. The manner of teaching proportion which the professor adopted has the merit of ocularly demonstrating one of the essential principles of design, for there are many people who imagine that a few inches more or less in

eye attends to the smaller individual parts instead of to the whole. To take a concrete case, a continuous barrack front looks much longer than an equal length of houses forming a street of the same height, because each separate house, being an upright oblong, arrests the eye, and the number of stories forms a scale to its real height. In design, then, the value of proportion is in composing the individual parts or subdivisions by giving them the proper ratio of height to width, and so drawing the eye from the proportion of the whole mass to that of the individual parts. What better illustration of this can be found than in towers? We constantly hear people talk of the proportion; it is either said to be squat or too tall, referring unconsciously to a standard in their mind's eye, from which they cannot get away. Thus, for example, St. Paul's dome would look very squat after gazing at a tower and spire like that of Salisbury, and many towers would look too short after seeing the Boston example. The proper proportion of any particular tower can only be judged by the individual parts or stories of which it is composed. It may look exceedingly tall and disproportioned if the belfry windows are small, and a mere repetition in every stage, but by subdividing the height into stories of unequal height, and by making the openings narrow and small here, and large there, the proportions will be pronounced excellent. Therefore, proportion is not a matter of mass only, though, of course, we have to see our buildings through dense fogs sometimes, when they ought to look pleasing, but is chiefly to be studied in the smaller parts of a design. Bad proportion in a window, a door, or a

simple device broadly treated is felt instinctively to be intolerably coarse. To teach applied design on rational principles, the student is in need not merely of examples in the art he is studying, but of demonstrations or models that will show him the most agreeable combinations. He should not be taught to copy furniture and decoration of various masters and styles, but be taught to realize for himself the due proportion between structure and forms of the plainest and most direct kind and the ornament that should accompany them. It is in these more extended ways we may learn the value of proportion in the arts of design, and not merely in regard to the heights and widths of openings, the proportions of columns and entablatures, and of apartments, which appear to be the only kinds of proportions that are recognized by the classic revivalists.—*Building News*.

AN IMPROVED HAND CIRCULAR RIP SAW.

The machine shown in the illustration is adapted for shops not supplied with power, and will rip boards or planks of hard or soft wood up to $3\frac{3}{4}$ inches thick and 19 inches wide. The feed can be made slow or fast by the cone pulleys on feed rolls, which are self-adjusting to thick, thin, or uneven lumber. Unskilled operators can do the work rapidly and truly, and the work is true and square, and easily dressed with the plane. An operator with ordinary strength and endurance can rip (line measure) 600 feet of one inch pine per hour, or six thousand feet in ten hours, and other woods and thicknesses at proportionate rates. By changing the feed to correspond with thicknesses or hardness of

**BARNES' HAND CIRCULAR RIP SAW.**

the width of a door or window make no difference whatever. The same disregard, or ignorance, of a pleasing proportion is seen in the planning or selection of rooms, as if it made no difference whether the room was square or oblong, and that furniture of a certain size and shape could be made to look equally as well in a square as an oblong room. The window, like the door, has its own pleasing proportion. We can widen a window, as Professor Banister Fletcher says, but we can easily spoil it by the operation, unless we take care to preserve the unit of proportion by subdividing the width by mullions, as in a Gothic window, or by bringing the eye to dwell on the proportion of one of the panes. But it is absolutely essential to preserve some unit or individual part in a wide window, or it would be quite as offensive as a wide doorway.

The lesson of proportion need not stop at windows and doorways; it can be applied not merely to plans of apartments and their heights, but to the art of composition itself. For example, Professor Fletcher might have shown that into his first illustration of breaking up a plain building front into parts, proportion enters. If, for example, we take a long, straight facade perfectly flat of blank wall, or with windows in it, equally distributed, we may have a proportion that offends by its length and monotony. But break it up by projecting or recessing certain parts, say the two extreme ends and a wide center, and the proportion of the whole is greatly improved, for, although not an inch of height has been added, the eye is arrested by the three individual parts into which the whole facade has been divided, and the extreme length, being broken by oblongs of the contrary direction, is rendered less fatiguing to the eye. By further dividing, or by making vertical lines, the proportions may be still more altered. The effect is mainly due to the fact that the

fireplace, will always be an eye-sore in a room, however well proportioned it may be. The same want of pleasing ratio will spoil a wall paper, the paneling of a door or dado, or any ornament, though the eye in the latter cases would have to be more educated. The ordinary sense of fitness in proportion is, however, pretty general; and, roughly speaking, we may say that it exists among people almost as strongly as the sense of harmony or music. As a discordant note jars on the faculty of hearing, so we find a glaring disproportion, or want of fitness, produces an unpleasant sensation on the mind.

Proportion is, however, not confined to ratios and dimensions; we experience its influence in the right proportion of mass to detail, of plainness to ornament, and these are quite as necessary to learn by those who are studying artistic kinds of expression. The value of models or illustrations in the designs of carpets, wall papers, decoration applied to furniture and metal work, is apparent. We often see patterns offensively obtrusive and distracting, owing to the want of quiet surfaces or a due intermixture of ground and pattern; furniture full of unrestful twists and turns, and carvings which distract rather than please; because the artist has not realized a sense of proportion between the plain parts and the ornament. These are things that can be taught by showing how much ornament can be placed on each part without overloading it, what surfaces or members should be plain, and which may be enriched. The whole question of ornament on a surface must indeed be in inverse ratio to the height of relief. Thus every square quarter inch on a Benares brass bowl may be occupied with incised ornament without offense to the eye, for the lines are narrow and the relief exceedingly low; but in repoussé work of massive relief in the same metal, anything beyond a

the lumber, hickory, maple, ash, oak, walnut or cherry can be sawed with ease, the speed (line measure) varying from one hundred and fifty to one hundred and sixty feet per hour. The machine is strong, well made and durable. The table is provided with an adjustable gauge, and by means of hand screw at rear end it can be readily raised or lowered to govern the depth of cut by the saw. Arranged in this way, rabbets, bevels, tenons, etc., can be cut to advantage, and by using two saws side by side, grooving for window and door steps, etc., can be done. Those desiring further particulars of this or other machines described in their large and elaborately illustrated catalogue should address the manufacturers, Messrs. W. F. & John Barnes Co., No. 567 Ruby Street, Rockford, Ill.

PATENTS.

Messrs. Munn & Co., in connection with the publication of the *Scientific American*, continue to examine improvements and to act as Solicitors of Patents for Inventors.

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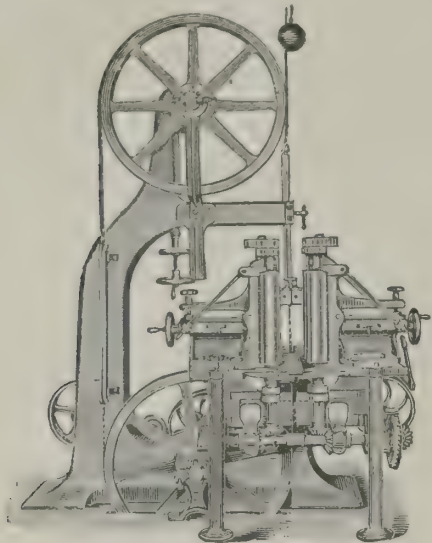
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AN IMPROVED BAND RESAW.

This is a machine which has been perfected by its manufacturers, Messrs. Frank & Co., of Buffalo, N. Y., after more than a year devoted to experiments, to meet the wants of customers asking for a resaw that would not waste so much lumber. The manufacturers prefer to send a man to set up the machine and give instructions as to its running. The wheels are made of wood, glued up in their sections, and are 42 inches diameter,



FRANK & CO.'S BAND RESAW.

$3\frac{1}{4}$ inches face. The journals for upper and lower wheel shafts are 12 inches long, and both have an outside bearing. The rollers are $4\frac{1}{2}$ inches diameter, and are geared in the same manner as circular resaws, giving a very strong and positive feed, instantly started and stopped by a clutch pulley. The rollers can be tipped for sawing bevel weather-boarding, etc. The machine is furnished with brass gauges to show at what angle it is cutting. Its capacity is 6 inches thick and 26 inches wide, and it will feed with the two feeds sent with the machine, 27 and 54 feet per minute. The machine weighs 4,500 pounds, its height is $9\frac{1}{2}$ feet, and the floor space required is 8 feet by 8 feet. The saws sent with the machine are two $2\frac{1}{2}$ inch saws, 25 feet long, one for hard and one for soft wood.

AN IMPROVED HOT WATER HEATER.

The accompanying illustrations represent different views of a new style of heater just perfected by the old established firm of Russell Wheeler & Co., of Utica, N. Y. The "Palace King" hot water heater is made of cast iron, in six sections, and so built as not to require fire brick or other non-conducting lining in the fire box, whereby full benefit is derived from the fire where it is the hottest, and at the same time the circulatory system is so arranged that the heat is evenly distributed throughout, water legs extending from the fire pot through the different sections. The ash pit is large, affording facility for readily removing the grate if desired, and a draft door is provided for regulating the draft from an upper room or by means of an automatic regulator. The grate is very heavy, and is both oscillating and dumping. As will be seen by the views, the construction provides for a long travel of the products of combustion before the smoke flue is reached, insuring thorough efficiency and preventing waste of fuel, while the fire can be readily regulated as desired for comfort in the mild days of spring and autumn.

Genuine American Terne Plates.

The Cincinnati Corrugating Co., of Cincinnati and Piqua, Ohio, have recently had supplied to them by their allied company, the Piqua Rolling Mill, a quantity of 14×20 terne roofing plates. It is said that the terne coating, composed of tin and lead, resulted beautifully, equaling, in the opinion of experts, in appearance and all other respects, the "Old Style" hand made ternes hitherto imported from Wales. In the composition of these plates not an ounce of foreign material enters; California furnished the pig tin, Missouri the pig lead, and the Bessemer steel used was made at

Middleport, Ohio, and rolled by the Piqua Rolling Mill Co.

The Cincinnati Corrugating Co. claim no other merit in this than that they give to all the results of their experience; that all that is necessary to test the practicability of making American tin and terne plate is to make them.

Porches, Windows, Stairs.

"Every country house demands a porch of some sort: dignity and hospitality both demand it; but the *porte cochere* is of more doubtful necessity; it may be made to take abundance of picturesque attitudes indeed, but is very apt—save under quite exceptional treatment—to put unwelcome shadows and gloom about an entrance, suggestive of lingering damp at the step, or of long unmelting annoyances of ice. Cheer, warmth, sunshine, ought to be flung with full hands about the grand and chiefest opening to a home.

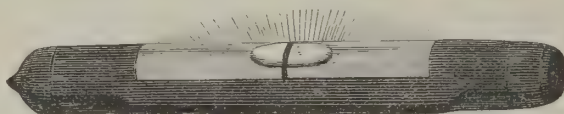
"As for the windows of a country house, the demand should be for largeness, and, again—largeness; indeed, some corridor with walls of glass is not a bad accompaniment for a flank or angle. Our sanitarians are getting, at last, to understand the glory and goodness of a winter's sunshine, and that it is no way needful to journey to the tropics for it.

"A country house without its fireplaces, or something with a blaze in them, is like a man groping for treasure with eyes put out.

"Next, stairs. To many a poor woman who has toiled a half life out upon an eight inch "rise" of stair, a lessening of the height by two inches (six and one-eighth inches is best) will seem like putting step on the road to Beulah. A steep step everywhere, and everywhere—except in a ship's steerage—is an offense and a blight and a curse."—Donald Mitchell, in *Scribner's Magazine*.

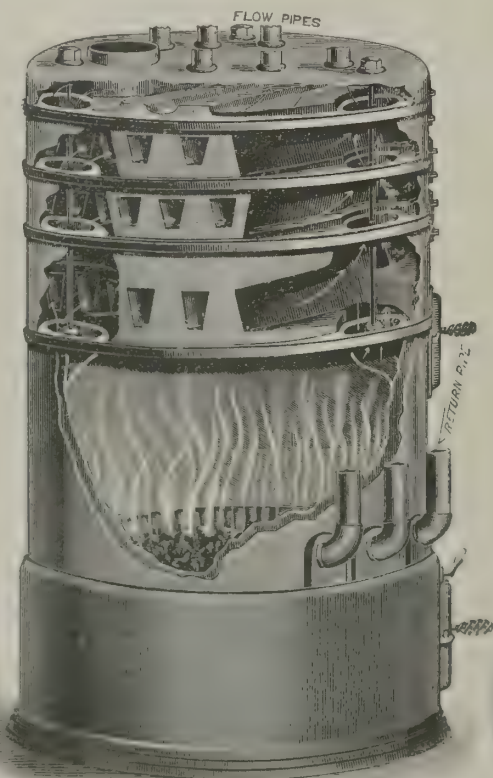
COOK'S LUMINOUS LEVEL TUBE.

The accompanying illustration represents a recent improvement which is being introduced by the Luminous Level Co., 22 Sixth Ave., New York, by means of which a level is made luminous, to facilitate the carrying on of work in places where the use of a level is necessary, but where the light is not good enough to readily see what it indicates, and even where it is absolutely dark. The tube is made in standard sizes,

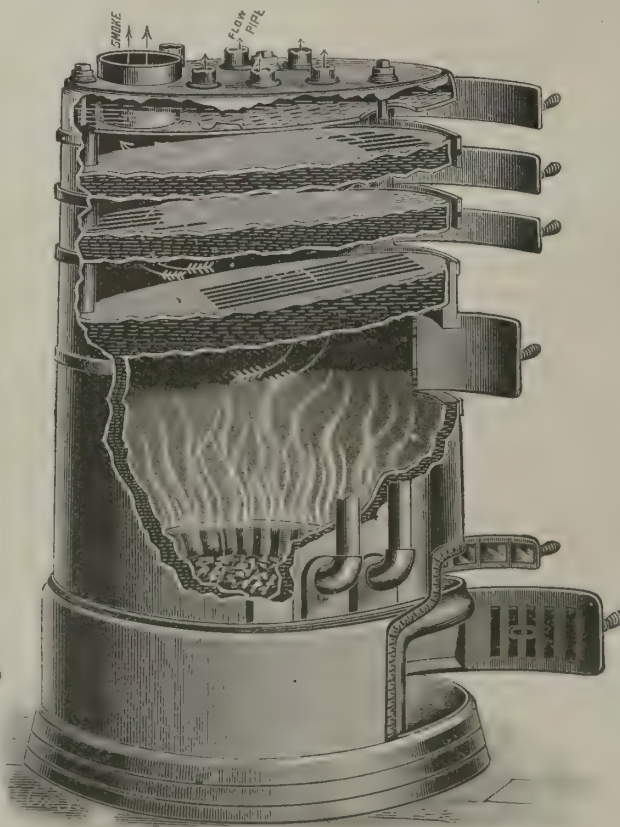


COOK'S LUMINOUS LEVEL TUBE.

of the usual form, to be set in the ordinary way, and a strip coated with a luminous compound is permanently attached to the bottom or back of the tube by means of a special form of wrapper, which excludes dust and is treated to withstand moisture. The bubble is visible from the side or top, as usual, and a non-luminous center is provided in addition to the center lines of the metal face plate. This improvement may be advantageously applied in levels of almost every description, making their readings in all cases more plain and distinct, while the luminous compound is continually kept in an efficient, light-giving condition, by simply keeping the level, when not in use, in a place where the light reaches it.



THE "PALACE KING" HEATER—WATERWAYS.



THE "PALACE KING" HEATER—HEAT TRAVEL.

FOX'S BARB WIRE POST.

J. E. Bolles & Co., Detroit, Mich., have recently begun the manufacture of Fox's patent post for barb wire fences, as shown herewith, and state that this post is especially adapted for railroads, ranches, etc. It is made of a single bar of 1 inch angle iron bent midway and the edges brought together along their entire length, thus making a square tube, the bend forming the top of the post. This tube is then secured to a four flanged pointed base as shown in Fig. 1. The wires are attached to the post by means of an adjustable



Fig. 1.



Fig. 2.

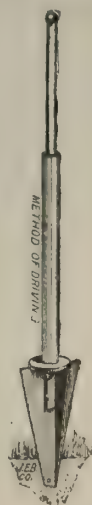


Fig. 3.

malleable clip which is held in place by a wedge, Fig. 2. To drive this post a piece of pipe large enough to pass over the clips is slipped down to the pointed base, the blows from the maul falling upon the top of the pipe. See Fig. 3. It is claimed that this post possesses several very important features, viz., it is very strong, rust does not affect it, and the united strength of two strong men cannot pull it from the ground; also that when the wedge is driven, the clip and wire are held rigidly in position, making a durable fence.

The Sykes Metallic Roofing.

The Sykes Iron and Steel Roofing Company, of Chicago, use a superior brand of iron and steel in the manufacture of their patent metal roofing, employing nothing but box annealed metal, which is designed to prevent the scaling off of paint. All of this roofing is painted on both sides with linseed oil paint, and in putting it on no screws or nails are passed through the surface of the roof, and expansion and contraction, due to changes in the weather, are fully provided for. This roofing can be put on any building by an ordinary mechanic.

The "Florida" Steam and Hot Water Heaters.

The Pierce, Butler & Pierce Manufacturing Company, of Syracuse, N. Y., engineers and contractors for the heating and ventilating of public buildings, residences, greenhouses, etc., manufacture different sizes of steam and hot water heaters, of proved efficiency, for almost any service that may be required, and adapted for any kind of fuel, either hard or soft coal, coke, or wood. The Florida "heavy duty" heater is designed to take the place of wrought iron tubular boilers for heating large buildings, and be absolutely safe against explosions, while being economical and durable. The hard coal Florida heater with a magazine feed is said to be managed as easily, and require as little care, as an ordinary base-burning stove, permitting of being left without attention for nine or ten hours during severe cold nights. The Pierce automatic and positive air valve combines the desirable principles of the automatic air valve with a positive compression air vent. The company also furnish all kinds of piping, valves and fittings and plumbers' supplies generally.

THE English consul at Canton says that eighty thousand pounds of human hair have been exported from that city during the past year, and that it comes mainly from those who have died of contagious diseases, mendicants, and criminals.

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ARCHITECTS AND BUILDERS

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No. 5.



RESIDENCE OF MR. H. P. RUGG, ST. PAUL—MR. A. H. STEM, ARCHITECT, ST. PAUL.

From the N. W. Builder and Decorator.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors,

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

NEW YORK, NOVEMBER, 1891.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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A \$2,500 HOUSE.

We publish as the subject of one of our colored plates in this issue a very attractive cottage, erected for Mr. C. L. Urlick, at Asbury Park, New Jersey. Among the principal features are the tower, bay window, and porte-cochere. Underpinning is of brick and the exterior above this is of wood, covered with clapboarding and painted light olive green, with trimmings of a darker shade. Roof slated. Dimensions: Front, 25 ft.; side, 44 ft., not including front piazza and rear porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft 6 in. The plan is excellent, rooms of good size. The interior throughout is trimmed with yellow pine, finished natural with hard oil. Hall contains an ornamental staircase turned out of ash. Parlor has a chimney breast with mantel. Library has a bay window and fireplace built of brick and furnished in the usual manner. Kitchen and pantries are replete in all their appointments. Second floor contains four bedrooms, den and bathroom. Three bedrooms can be finished off in open attic if desired. Cemented cellar under whole of house. Heated by a furnace. Cost, \$2,500. Our plate was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT LARCHMONT MANOR.

We present as the subject of one of our colored plates in this issue "The Den," recently erected for Gerald Hayward, Esq., at Larchmont Manor, New York, and from plans prepared by the proprietor. This design is of the old Colonial style of architecture, and the exterior throughout is covered with shingles left to weather finish; trimmings and blinds are painted bottle green. There is a cemented cellar under whole of house, containing laundry and furnace. The wall to this cellar is built of local stone, laid up rock faced and pointed in cement. Dimensions: Front, 52 ft. 6 in.; side, 36 ft. 6 in., not including porch and piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in. The interior is complete, and the several rooms communicating as they do make a most attractive vista of the entire floor. The hall is handsomely finished with oak; the walls are wainscoted in panels three feet high, and the ceiling has a massive oak cornice. The broad, low staircase and paneled divan are the features of the hall, while the large open fireplaces, window seats and spindle transoms of the other apartments carry out the quaint effect so successfully sought. Library and drawing room are trimmed with whitewood, finished natural, and each have heavy moulded cornices and open fireplaces, the latter furnished with tiled hearths and hard wood mantels. The den is trimmed with walnut and is separated from drawing room by an arch supported on columns; it contains divans, window seats, ceiling beams, and fireplace, the latter having a tiled hearth and a mantel of walnut elegantly carved. Dining room, spacious, is finished in cherry, and it contains fireplace and mantel, large china-closet, and window opening into conservatory. The floors throughout are of hard wood, laid in narrow widths. Kitchen and pantries are trimmed and wainscoted with North Carolina pine, finished natural with hard oil, and are replete in all their appointments. Second floor contains six bedrooms, large closets, studio, and bathroom, all trimmed with whitewood, finished natural. The walls of studio 8 ft. 6 in. above floor are ceiled with narrow beaded stuff; it contains a staircase to look out over. Bathroom is wainscoted and fitted up in the best possible manner. Our plate and engravings, pages 67 and 71, were made direct from photographs taken of the building specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT PLAINFIELD, N. J.

We present, on page 68, a cottage erected for Mrs. Frances P. Curtis, at Plainfield, N. J. The design is excellent, and the features of the exterior are the pleasant porches, bay window, and chimney, which is built of red sandstone, rock-faced, and laid up at random; top of chimney and underpinning are built of brick. First story is clapboarded, and painted colonial yellow, with white trimmings; second story and gables are shingled and left to weather stain; roof shingled. Dimensions: Front, 40 ft.; side, 37 ft. 6 in., not including piazza and porch. Height of ceilings: cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with California whitewood, and finished natural. Reception hall contains an ornamental staircase of unique design, lighted on second landing with windows glazed with stained glass. Fireplace in hall is built of brick, while the one in drawing room is handsomely furnished with tiles and mantel of exquisite design. Dining room, good size, is well lighted. Kitchen and butler's pantry are wainscoted and are fitted up in the best possible manner. Second floor contains four spacious bedrooms, large closets and bathroom, the latter wainscoted and fitted up replete. Three bedrooms and storage on third floor. Cemented cellar under whole of house contains laundry, furnace, and other necessary apartments. Cost, \$6,500 complete. Messrs. Rossiter & Wright architects, New York.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A STATEN ISLAND COTTAGE.

We present on page 69 the plans and elevation of a dwelling of low cost, erected for the Rev. J. S. Spicer at New Dorp, Staten Island. Dimensions: Front 29 ft. 6 in.; side 31 ft. 6 in., exclusive of rear porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 7 in.; third, 8 ft. Underpinning built of brick laid in red mortar. First story clapboarded and painted pearl gray, with dark olive green trimmings. Second story, gables and roof are shingled and painted red.

The plan is good and it contains eight large rooms, eleven closets and bathroom. The trim throughout the interior is of whitewood. The first floor is stained and finished in cherry. Staircase is neatly turned out of oak and finished natural. Fireplaces are built of brick, and each have hearths laid with same and are also provided with hard wood mantels. Kitchen and pantries are replete in all their appointments. Second floor contains three bedrooms and bath; the wood work being treated in colors with the exception of bathroom, which is wainscoted and stained cherry. Bathroom is fitted up in a first-class manner. Third floor contains two bedrooms and ample storage room. Cemented cellar contains laundry and furnace. Cost, \$3,300 complete. Mr. Meserau architect, New York. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT ROCHELLE PARK.

On page 72 will be found illustrations of a cottage erected for F. W. Steinbrenner, Esq., at Rochelle Park, N. Y., from plans prepared by the proprietor. The engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN. Dimensions: Front, 35 ft. 6 in.; side, 40 ft. 6 in., not including piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Foundation, stone. Underpinning and balustrade to piazza are built of brick laid in red mortar. First story is clapboarded, and second story and gables shingled, painted colonial yellow, with ivory white trimmings. Blinds painted bronze green. Roof covered with octagonal cut slates with terra cotta crests and finials. The convenience of the interior is apparent, as a study of the plans will reveal, and it is handsomely finished with hard wood. Hall, trimmed with cocobola, contains a very handsome staircase turned out of similar wood, with newel elegantly carved. This staircase is lighted by a large stained glass window and is also provided with a paneled divan. Beneath this landing a toilet is located. Floors throughout are of hard wood. Parlor is finished in ivory white (dead) with a little gilt; it contains a piano window at side, glazed with stained glass, and an open fireplace, with hearth and facings of Mexican onyx, and a mantel of exquisite design. Library is trimmed with cocobola and it has a French window opening out upon porch, which is inclosed with glass in winter and used for a conservatory. Dining room trimmed with light walnut; it has a fireplace with Mexican onyx hearth and facings and an oak mantel. Butler's pantry is of sufficient size to contain the usual fixtures. Kitchen is wainscoted and trimmed with North Carolina pine, finished natural with hard oil. Second floor contains four large bedrooms, bathroom and five closets. These apartments are trimmed with light walnut and cherry. Bathroom is wainscoted with cherry and is replete. Two bedrooms and large storage room on third floor. Cemented cellar contains laundry and furnace. The proprietor gives \$10,000 as the cost of the building, but says it could be built for \$8,600.

A RESIDENCE AT ASBURY PARK.

We present on page 73 the plans and elevation of a dwelling erected for Dr. Henry Mitchell, at Asbury Park, New Jersey. It is of the American style and has an abundance of piazza room, porte cochere, and an interior plan well arranged and fitted up complete. It is built of wood, above an underpinning of brick. The first story is clapboarded and painted light olive green, with bottle green trimmings, while the second story and gables are shingled and painted tile red. Roof shingled and painted Indian red. Dimensions: Front, 38 feet; side, 50 feet, not including piazza and porte cochere. Height of ceilings: Cellar, 7 feet; first story, 9 feet; second, 8 feet 6 inches; third, 8 feet. The interior throughout is trimmed with yellow pine, finished natural with hard oil. The doors and windows have beaded casings and turned angle blocks. Hall (8 feet wide) contains an ornamental staircase turned out of similar wood. Library and parlor each have open fireplaces, built of brick, with tiled hearths and facings, and hard wood mantels made especially from designs. Dining room has a large bay window and a buffet built in of unique design. The floors are of hard wood laid in narrow widths. Kitchen, laundry, and pantries are wainscoted, and each are fitted up in the best possible manner with the usual fixtures. Second floor



A RESIDENCE AT LARCHMONT MANOR.



First Floor.

PORTE-COCHERE.

contains four good sized bedrooms, six large closets and bathroom, the latter wainscoted and fitted up complete. Three rooms on third floor. Cemented cellar, under whole of house, contains furnace and other necessary apartments. Cost \$4,300 complete. Messrs. Palliser & Palliser architects, New York City, N. Y.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT CHESTER HILL, NEW YORK.

The engraving and plans, page 75, illustrate a model cottage erected for the Rev. H. Q. Bodley, at Chester Hill, Mt. Vernon, New York. Dimensions: Front, 28 ft. 6 in.; side, 46 ft. 6 in., not including piazza. Height of ceilings: cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The design is very attractive and the plan is excellent. It has a pleasant piazza across the front, extending on either side, a balcony over, a lookout at third story and many other features. The broad low

graph of the building taken specially for the SCIENTIFIC AMERICAN.

A HOUSE AT FORDHAM HEIGHTS.

We illustrate on page 76 a cottage erected for Mr. Cadwell, at Fordham Heights, New York. Dimensions: Front, 30 ft. 6 in.; side, 42 ft. 6 in., exclusive of piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The underpinning is built of rock-faced stone laid up at random; the superstructure above is of wood, with the first story clapboarded and painted light olive green, with bottle green trimmings, and the second story and gables shingled and painted yellow. Roof slated. The plan presents spacious rooms, conveniently arranged. The first floor is trimmed with cherry, finished natural. Hall contains a staircase of handsome design, with spindle balusters and newels. This hall and staircase are lighted by windows, glazed with stained glass. Parlor and library are well lighted

brick, while the building above is of wood, clapboarded and painted light terra cotta, with light brown trimmings. All shingle work painted red. Roof covered with octagonal cut slate. The interior throughout is trimmed with yellow pine, finished natural with hard oil. Hall has an octagonal projection, with front door in center and windows on either side, glazed with stained glass. Staircase is of unique design and neatly turned out of yellow pine. Parlor and library each have neat hard wood mantels. Kitchen and its apartments are wainscoted and fitted up complete. Second floor contains four bedrooms, large closets and den, which could be utilized for a bathroom. Attic has ample room for storage and rooms could be finished off if desired. Cost \$2,700 complete. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

Clover Honey.

The honey of the Malta bees has long been noted



INTERIOR VIEW—A RESIDENCE AT LARCHMONT MANOR.

[See colored plate, also pages 66 and 71.]

staircase, turned columns, and spindle transom of hall, the brick fireplace, antique mantel, paneled divan and the old casement window in dining room carry out the antique effect sought. Parlor is finished in old ivory white, with a little gilt, and it contains an open fireplace, with hearth and facings of white enameled tiles and mantel of exquisite design, with beveled plate, mirror, etc. Hall is trimmed with ash, library with cherry, and dining room with whitewood finished in oak. Kitchen and its apartments are trimmed and wainscoted with whitewood finished natural, and are fitted up in the best possible manner. Second floor contains five bedrooms, with large closets and bathroom. These apartments are trimmed with white, stained, and finished in cherry. Bathroom is wainscoted and fitted up replete. Linen closet, in rear hall, has a case of drawers and shelves with glass doors. One bedroom and billiard room on third floor. Cemented cellar contains laundry, furnace and other apartments. Cost \$4,800 complete. Mr. Walter F. Stickles architect, same place.

Our engraving was prepared direct from a photo-

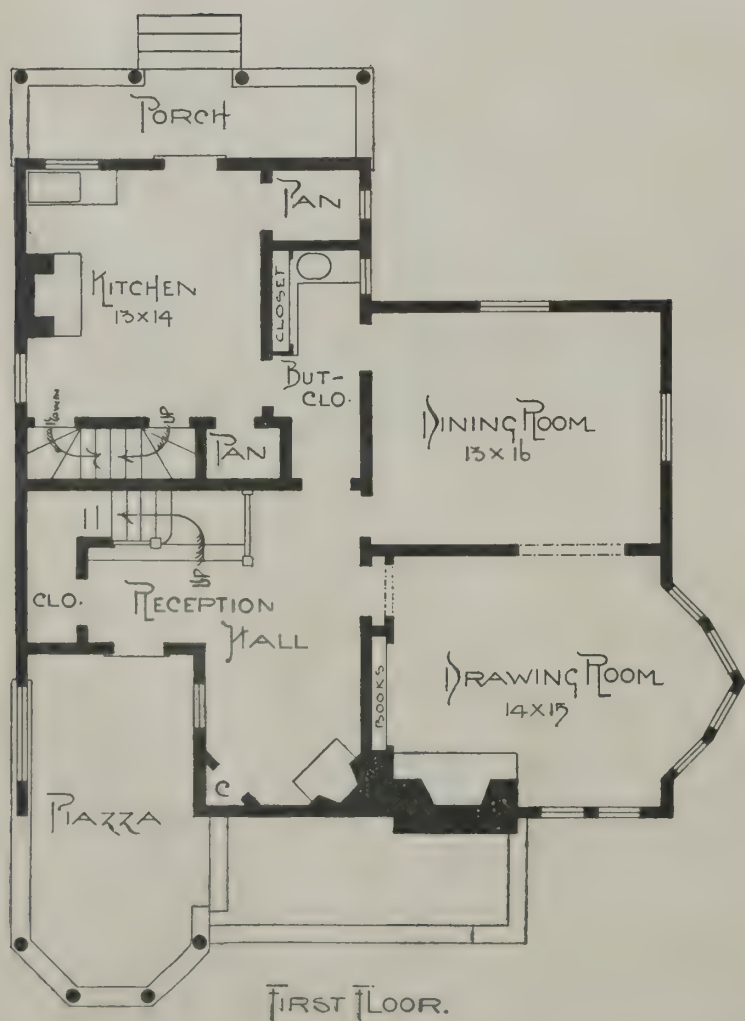
and each provided with open fireplace, furnished with tiled hearths, and facings and hard wood mantels of excellent design. Floors of hard wood, laid in narrow widths. Kitchen, isolated from rest of house, is wainscoted and fitted up with sink, wash trays, range and pantries replete. There are four bedrooms, with large closets, and bathroom on second floor, all trimmed with antique oak. Bathroom is wainscoted and is furnished with the usual fixtures in a first class manner. Two bedrooms and trunkroom on third floor. Cemented cellar contains furnace. Cost \$5,800 complete. Mr. Milton See architect, New York. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A COTTAGE AT ASBURY PARK.

We present in this issue, on page 77, the plans and elevation of a cottage recently completed for Mr. W. L. Atkinson, at Asbury Park, New Jersey. Dimensions: Front 28 ft., side 4 ft., not including piazza and porch. Cemented cellar of good height, with first story 9 ft. and second 8 ft. 6 in. The underpinning is of local

both for its purity and for its delicious flavor. A writer in the *Mediterranean Naturalist* says the flavor is largely due to the extensive crops of sulla (clover) that are annually raised throughout the islands, from which the bees derive the largest proportion of their material. It is estimated that to collect one pound of honey from clover, 62,000 heads of clover must be deprived of nectar, and 3,750,000 visits must be made by the bees.

IF any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address: Munn & Co., SCIENTIFIC AMERICAN office, New York.

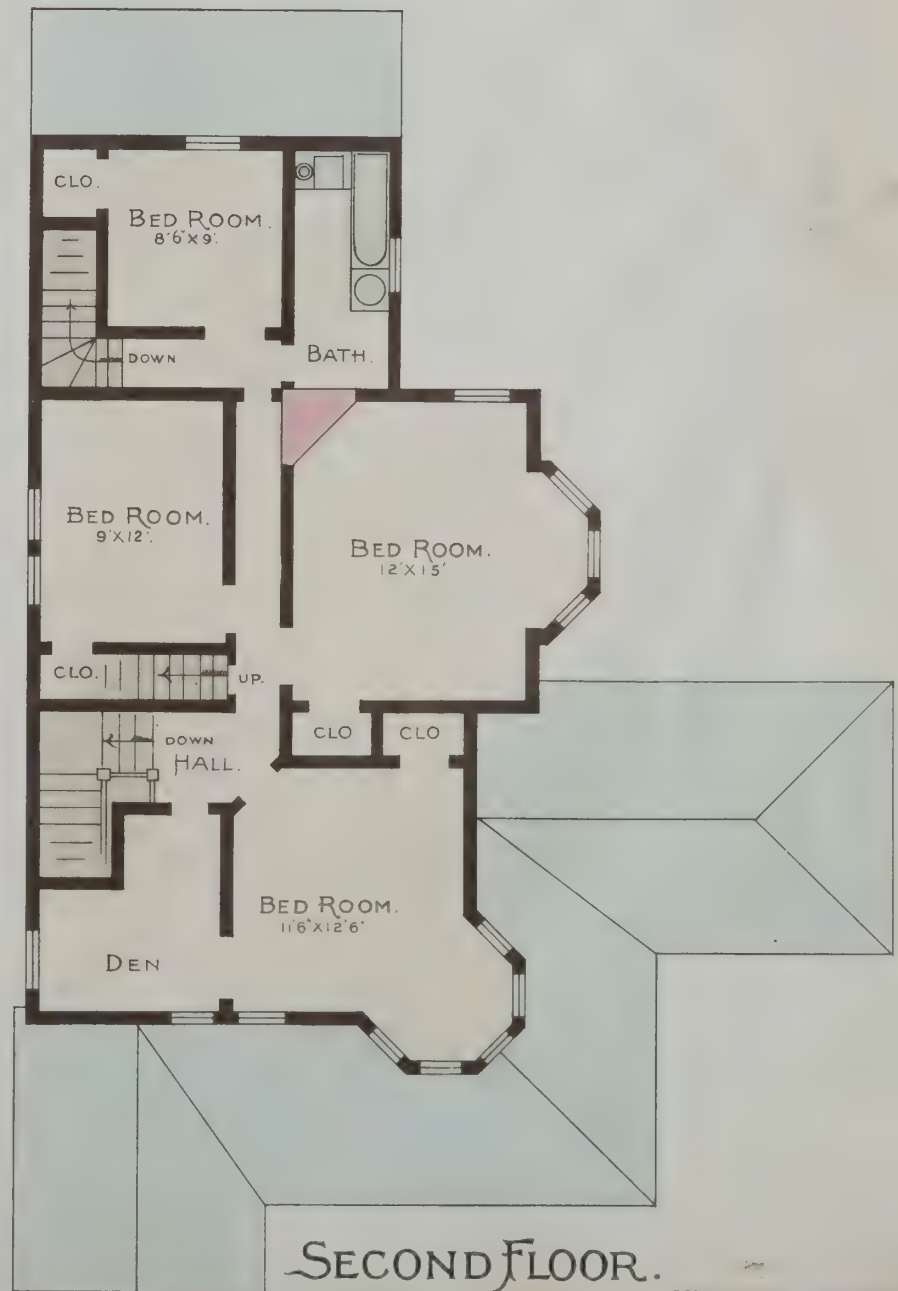
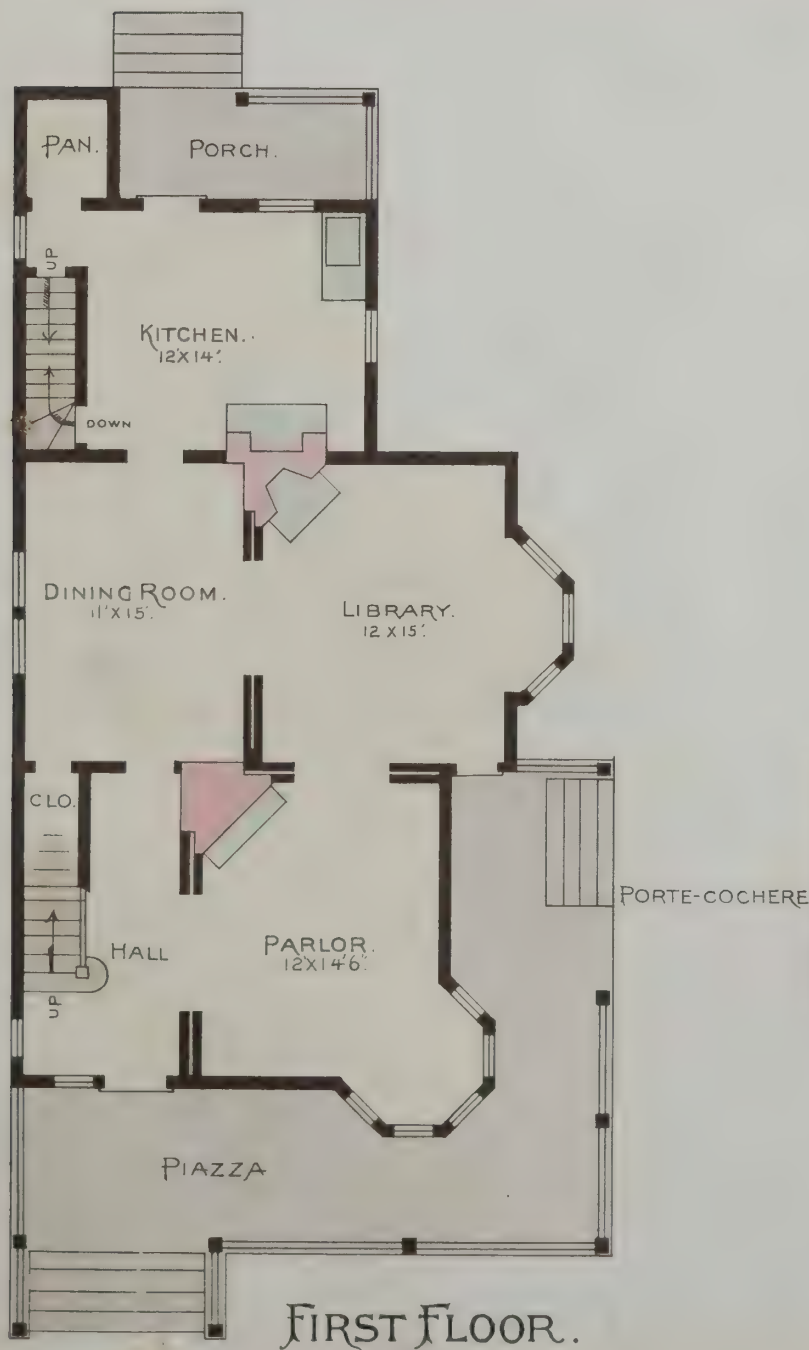


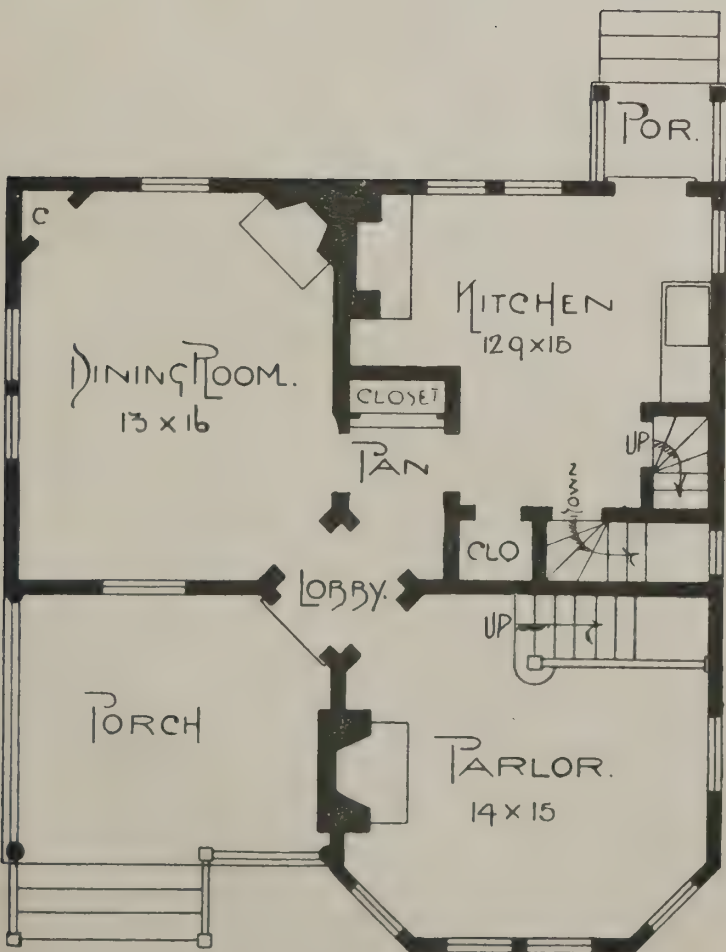
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A COTTAGE AT PLAINFIELD, N. J.

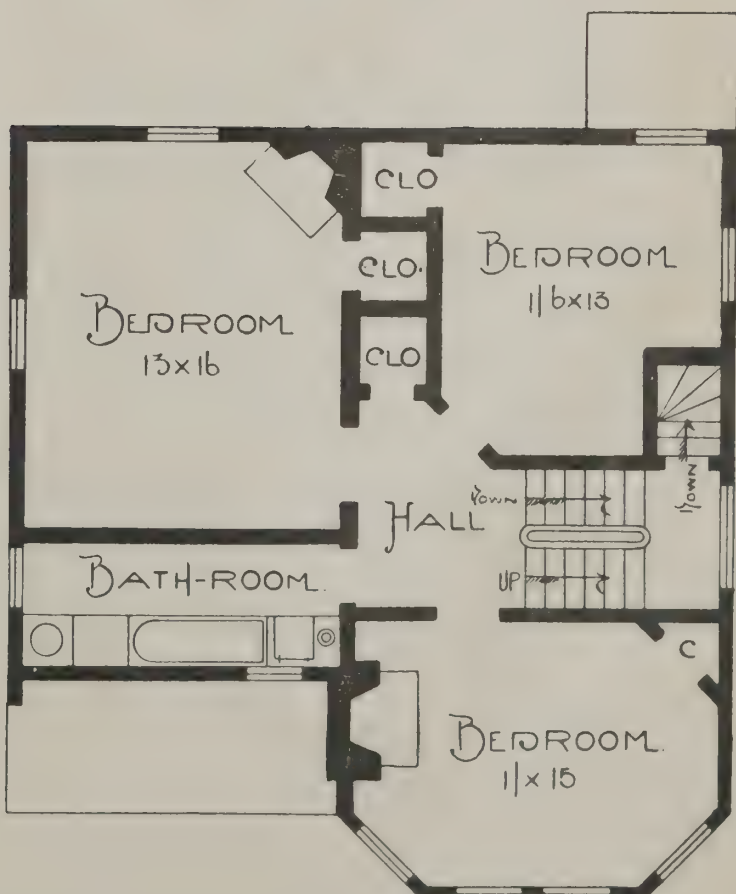


A TWENTY FIVE HUNDRED DOLLAR HOUSE.





FIRST FLOOR.



SECOND FLOOR.

[See page 66.]

A STATEN ISLAND COTTAGE.

Fire Precautions in Building.

Some very valuable suggestions to architects and builders are embodied in the methods of constructing buildings urged by the Boston Board of Underwriters. First of all particular stress is laid on the importance of having solid division walls between buildings put up in blocks, so as to cut off each from its immediate neighbors. Moreover, these division walls should be carried as parapets at least a foot above the roofs, and when there are projecting gutters or cornices, the side walls should be corbeled out at least six inches from the front or rear walls. These recommendations apply to frame as well as to brick, stone, or iron buildings; the object is to prevent a fire starting in one building from extending to another. The only sure way of accomplishing this is by having a solid cut off in the shape of a brick wall at least eight inches thick, and preferably twelve, with a parapet to break the continuity of roofing.

In many cases after a solid division wall has been built, however, it becomes necessary to cut an opening through it to connect an adjoining building. When this has to be done, swinging doors, not of iron, but of two thicknesses of tongued and grooved $\frac{3}{4}$ inch boards, laid at right angles to each other, and nailed with wrought iron nails, driven flush and clinched on the under side, should be put in. These doors must also be covered on both sides and edges with sheets of tin locked together like a tin roof, the sheets being secured in place by narrow cleats of zinc. Nails driven through the sheets will not be allowed

from above over the platform and between and over the laths to a thickness of from two and one-half to three inches, and is forced in under the laths and under the joists and girders. The mortar being gauged soon sets enough to allow the platform to be moved to another place, until the whole ceiling is formed. The finishing coat of plaster is then put on. Such a ceiling is a solid mass, and will resist any fire which can act upon it from below.

Above, rough battens in short lengths, and stout enough to bear the weight of a man without bending, are laid, without abutting upon each joist, and as near together as they will lie without being placed on their edges. Upon this rough and loose floor, mortar of similar consistency as that used for the ceiling is laid to the thickness of three inches, and as it is made to fill all the spaces at the ends and sides of these floor laths laid upon the joists, the laths become embedded upon the joists, which are, to a considerable extent, also incorporated with the plaster. The result is an exceedingly firm one. With partitions the French first frame and brace them as we do here, except that oak is commonly used. They then nail on horizontally strong oak batten laths from two to three inches wide, at from four to six inches apart. The spaces behind the laths are then loosely filled up with stone rubble, which the laths prevent from falling out. To this is applied a strong mortar made mostly of plaster of Paris, laid on from both sides at the same time, so that the mortar pressed through from opposite sides meets and embeds the stone rubble by filling up every crack

walls, thus giving outlet to the water which may be thrown into the building in case of fire, and preventing it from damaging the merchandise stored on the floors below.

Other points of advice volunteered are—Don't carry the end of a floor timber into a chimney flue; don't have a brick or stone hearth rest directly on wood work; give steam pipes a clear air space of two or three inches around them, put skylights in iron frames, surround all four sides of well holes made in buildings for light and ventilation with brick, terra cotta block or other approved fire-resisting materials. etc.

What Taste with a Little Money May Accomplish.

The following inexpensive plan of furnishing may suggest something to others than a poet's wife.

In the house of a literary man, not far from New York, the need of a sanctum for the head of the family was imperative, but space and means were alike limited. The only room which could be spared was a hall bedroom on the upper floor. The poet's wife was equal to the situation, according to *Harper's Bazar*, and with her own hands she gave the somewhat defaced wood work a coat of ivory-tinted paint. She painted the floor a rather dark bluish slate color. She bought six rolls of bluish gray ingrain paper at twenty-five cents a roll, and had it laid at an expense of twenty cents a roll. In place of a cornice she bought thirty feet of pine moulding at a cent a foot and painted it ivory white. This was nailed to the wall just beneath the ceiling.



ACCEPTED DESIGN FOR THE COMPLETION OF THE SOUTH KENSINGTON MUSEUM—ASHTON WEBB, ARCHITECT.

The edges of the doors where they come together should be rabbeted, the single boarding of one door extending over that of the other about an inch, so as to make a close joint. The door frames should be of wrought iron properly secured to the brick walls; the door sill of boiler iron plate, and at least four inches wider than the thickness of the wall; and all hooks, latches, and bolts should be of wrought iron. Doors of the above description must be placed on each side of the wall.

If sliding doors for any reason must be used, they are required to be constructed on the same or a nearly similar plan to swinging doors, being wooden and covered with tin in all cases. Special directions are given for their equipment in position. Doors of this description should also be placed on each side of the wall.

As to shutters for the upper windows of manufacturing or mercantile buildings, likely to be exposed to danger from neighboring fires, the Board recommends that they be made in the same way as the swinging and sliding doors referred to, with this exception, that one-inch boards be used in the place of $\frac{3}{4}$ inch. The window frames and all fastenings, hooks, and other parts should likewise be of wrought iron. If the shutters are made in two parts, the edges coming together should be rabbeted.

The internal construction of a building next claims attention. In France all manner of buildings are so constructed that a fire starting in one room or on one floor seldom breaks through its environment. The floors in that country are made in the following manner: The carpenters' work completed, strong batten laths are nailed up to the under side of the joists, the same laths that we use, only thicker and wider, and are placed so far apart that not more than one-half the space is occupied by them. This being done, a platform of rough boards is braced up parallel to and about an inch below the laths. Mortar is then laid on

or space, while it has enough body on the surfaces to cover up and embed the timber and the laths.

In covering the inner surfaces of exterior walls a similar method is followed. The staircases, which are usually of wood in France, are also filled with a solid mass of concreted rubble, and though they may be set on fire, they will not burn.

In this country the safest construction in buildings intended for mechanical purposes is what is known as mill construction. This applies more to the internal than to the external features, for upon the construction of the floor depends in a large degree the safety of a building from fire. The Boston building laws require that columns for internal support shall not be further apart than twelve feet; therefore main beams must be placed twelve feet on centers, resting on an iron cap on the columns and properly secured to the girder. An immediate beam is then hung to the girder by a suitable iron stirrup, which really makes the floor timbers six feet on centers. The under floor should be three inch plank, tongued and grooved and properly spiked to the beam. Then a coat of plaster or lime mortar, or two thicknesses of heavy asbestos paper, should cover the entire area of every floor. Upon the plaster or paper should be laid a top floor of one and one fourth inches in thickness. For flat roofs, timbers are put together in the same manner as the floor timbers, and are covered with two-inch plank, tongued and grooved, and the roof then covered with copper, tin or gravel. Stairways and elevators are built in brick shafts, having their walls carried one and one-half feet above the roof, with skylights on the top, and double fire doors are placed at all openings of stairways and elevators leading to the various floors.

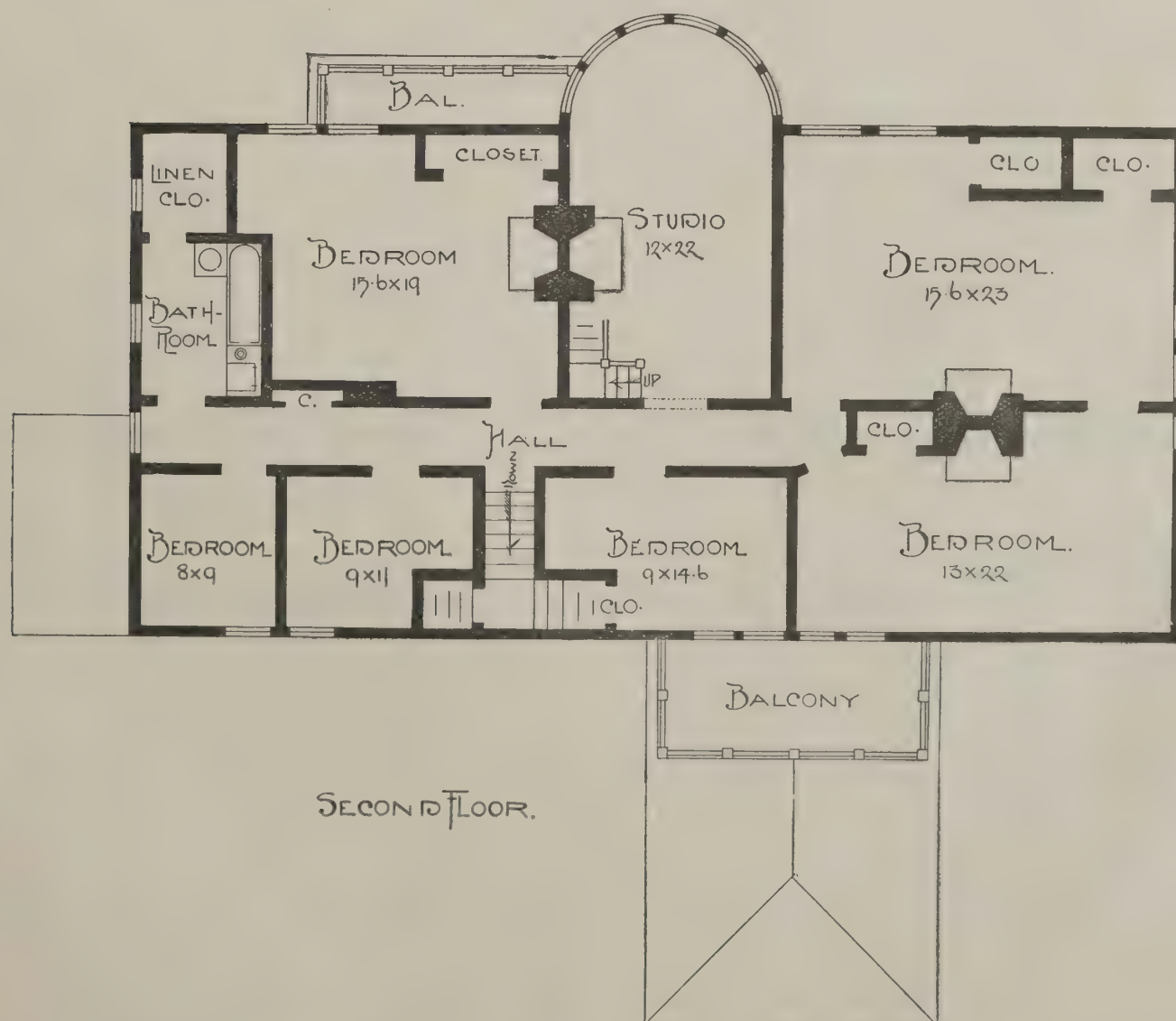
The same plan of construction may be wisely followed in the erection of stores and warehouses. It would be well, however, to have the floors pitch from the center, one inch to ten feet, to scuppers in the internal

At one side of the room she built, with a little assistance from a carpenter, an elaborate set of book shelves, reaching from the floor to within three feet of the ceiling. These shelves were divided into four compartments by the uprights, and no two compartments were alike. Some had high shelves and some low shelves, and there were two spaces, two feet square, in which to stow away magazines and newspapers. At one end was a hinged shelf for a dictionary, and above it a set of old pigeon holes were slipped into a space left for them.

For a table she got a deal kitchen table with a drawer. She gave this and the bookcase two coats of common black paint and a third coat of carriage varnish. A high-backed wooden chair, which she bought for a dollar and a half, received a like treatment, as did an old piazza chair with a splint bottom. The latter two were first washed with strong potash lye, to remove all traces of varnish.

The upholstery of the room was very simple. At the window were a gray holland shade and a white muslin sash curtain. In the summer, as the window was a sunny one, the blinds were fastened back, and their place supplied by a blue and gray awning.

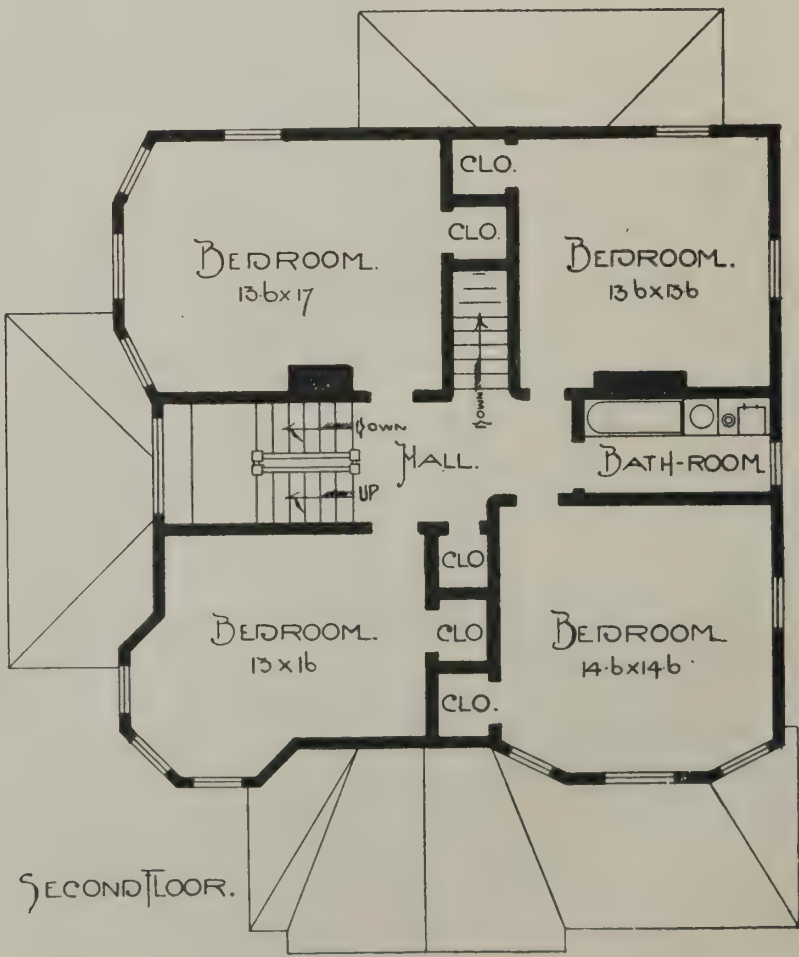
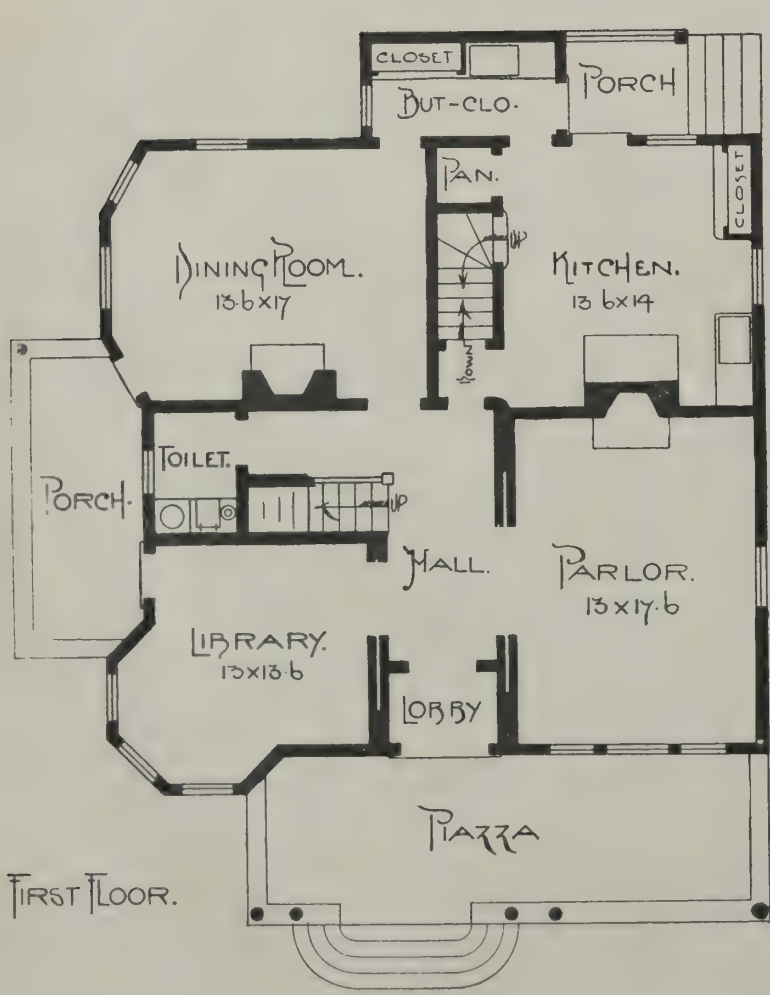
Parts of the bookcase were curtained with blue lining sateen lightly embroidered in white, washed and ironed, and lined with cheese cloth, and a similar curtain was hung across the doorway. The floor was partially covered by a rug of gray-blue filling heavily fringed at either end. The same material cushioned the splint chair and covered a hassock. A generous waste basket of birch bark with a large blue bow stood by the writing table, which, besides the usual paraphernalia, had a large blotter and a student lamp. The few pictures were wood cuts or photographs framed in passepartout. One or two plaster casts and some bits of Japanese pottery completed an interior at once tasteful and utilitarian.



SECOND FLOOR.

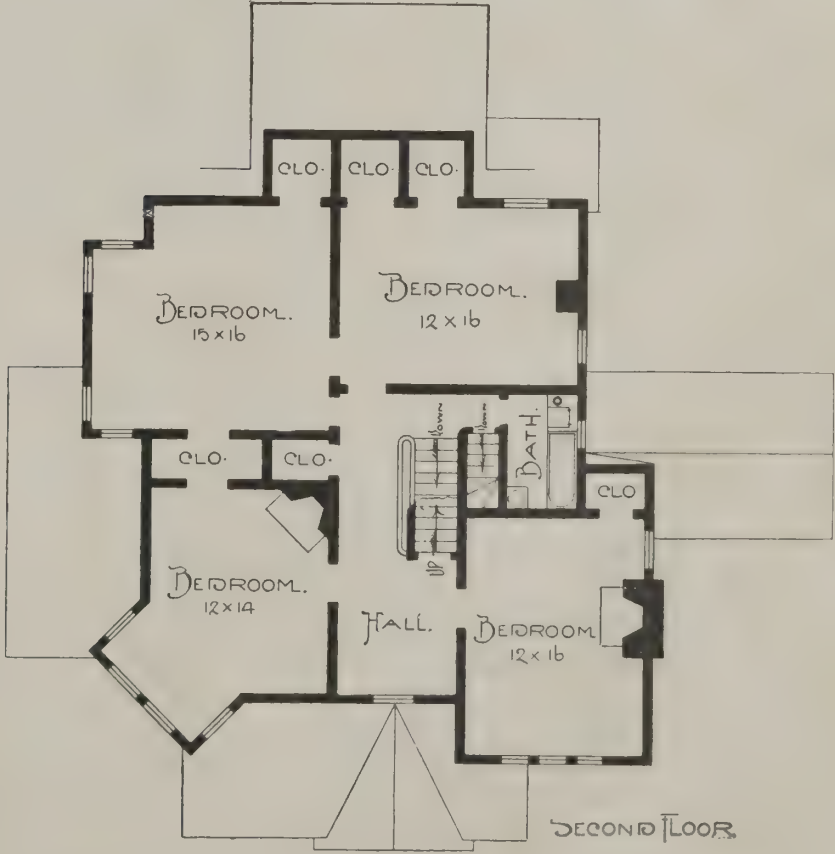
[See page 66.]

A RESIDENCE AT LARCHMONT MANOR.



[See page 66.]

A RESIDENCE AT ROCHELLE PARK.



[See page 66.]

A RESIDENCE AT ASBURY PARK.

WROUGHT IRON GATE.

The engraving below represents a wrought iron gate, constructed after designs by A. Wegener, by the firm of Dregerhoff & Schmidt, Berlin, for the doorway of the restaurant Sieben, Behrenstrasse No. 24, Berlin. The gate is designed in the Romanesque style and has all its parts welded, the middle ornaments being forged and cold hammered. The lantern supported above the gate is executed in the same style and is arranged for electric light.

Plan Designing.

The best instruction in plan design is that of examining a number of designs for any kind of building, such as we meet with in a competition. By comparing the good and the inferior plans, we begin to discover what the strong points are in the good and the weak points in the mediocre plans. We shall find invariably that the poor plans are distinguished by looseness; that they are rambling and straggling; the corridors are long and crooked; the apartments thrown here and there without any connection. The salient mark of the good plan is invariably compactness and coherency. Again we look further. We find a method in the clever plan. If there are principal rooms or departments they have been consigned to positions having some distinct relation to the site; they are prominently located along some axis, or brought to play an important part in the general design. The inferior plan has no such method or principle apparent. Comparing again the plans, we find a waste of ground in the inferior set. Here there is a large space wasted in a corridor or area; but perhaps the entrance is cramped. If the site is irregular, it is ten chances to one the author has lost space along the curved or oblique boundary, that the blocks are made to follow the boundaries, and that the angles are not at right angles. The expert planner has taken care to make his main frontages, if possible, square, so that the main walls should be parallel, and this he does because he knows the bad effect of crooked roofs and towers if their sides appear so on main facades.

Wasteful arrangements of corridors and offices are common, and so are areas for light. But the principle of economy is only learned after some experience, and depends mainly on the principle of compactness. Much space is lost in dealing with irregular boundaries. The novice is an adept at making crooked corners and leaving spaces. He generally places his blocks parallel to the oblique sides, and in thus disposing of them creates an irregular area in the center, spoiling the interior of perhaps a hall or some apartment. The contrary process is the course resorted to by the skillful artist. The economical designer boldly makes his main blocks parallel to one principal street or boundary of the site, or assumes an axis, to which they are made parallel. The irregular corners left between the main building and the raking boundaries are thrown out on a rear or inferior side of the area, are filled up by subordinate offices, and are left simply as areas of triangular form for light and air.

Direct and easy access, well lighted corridors, suitable proportions of apartments, and that architectural *finesse* which distinguishes the masterly from the crude attempt, are other characteristic elements of a clever plan, to each of which we may refer; but these are details which follow from attention to the foregoing principles.—*Building News*.

Simple Precautions against Fire and Rats.

One could not contrive a more perfect system of arranging a quantity of lumber to have it burn quickly than by using it to construct a modern house. The open spaces in the outside walls between the boarding and plastering, and in the partitions, and between the floor timbers, form a perfect network of flues. If a fire starts in the lowest part of the house, those flues, with the shavings and chips usually left there, carry the fire to the attic and roof instantly; or if it starts above, the coals and fragments of fire fall down through those flues, thus spreading the fire very rapidly.

The suggestions that I have to offer as an improvement in house building are simply to let the lining floors in each story extend to the outside boardings, and lay one course of brick in mortar on the floor between the studding; refuse or broken brick or small stones will answer; fill in inside the partitions in the same way if necessary, not forgetting to stop all openings around steam and other pipes and every other place where a mouse would be liable to go or gnaw through. A little care and eight to twelve dollars will cover the cost in an ordinary house. At greater expense more might be done as a protection against fire. If the house is plastered before the finish is put on, it is a good plan to plaster down to the lining floor on the outside walls, and, in fact, all of the walls, instead of

plastering to grounds six or seven inches from the floor.—A. W. Page, *N. Y. Evening Post*.

Floor Painting.

An exposed floor should be laid down very carefully in the first place by the carpenters, in white lead. (The tongue and groove should have a coating of thick lead just before joining together.) However, as the painter has no control over this, this suggestion is indicated more for the benefit of architects and builders than for his. Whether this is done or not, the next operation is that of priming. It is of the utmost importance that this should be done when the wood is free of moisture in ordinary painting; in floor painting it becomes an absolute necessity that it must be so, for no subsequent amount of painting will last without that condition be fulfilled.

It matters not so much what is used in priming, so that good raw linseed oil is used, and the pigment used with it be finely ground and well brushed in and out. This is essential, that all the pores may be filled as much as possible. It requires a conscientious man to do it, not any one, as the usual practice is. Simply hiding the bare wood from sight with paint is not

applied to good priming and become thoroughly dry, they will be as hard or harder than metallic lead, and be elastic as well.

If this method of painting floors was more in vogue, there would be much less objection to painted floors on the part of housewives than there is now, for their great objection to these is the necessity of frequent repainting to keep them in decent condition. Painted floors for kitchens, dining rooms, nurseries, halls, billiard rooms, etc., would be the rule instead of carpeting them as now. Carpets are very useful, but are not wanted in such rooms as we have enumerated, and are now used to simply hide the soft pine floor.

As every one is not able to have hard wood floors, it is certainly to the interest of the craft to give the housewife something that will take the place of the dirty carpet and that will give them employment as well.

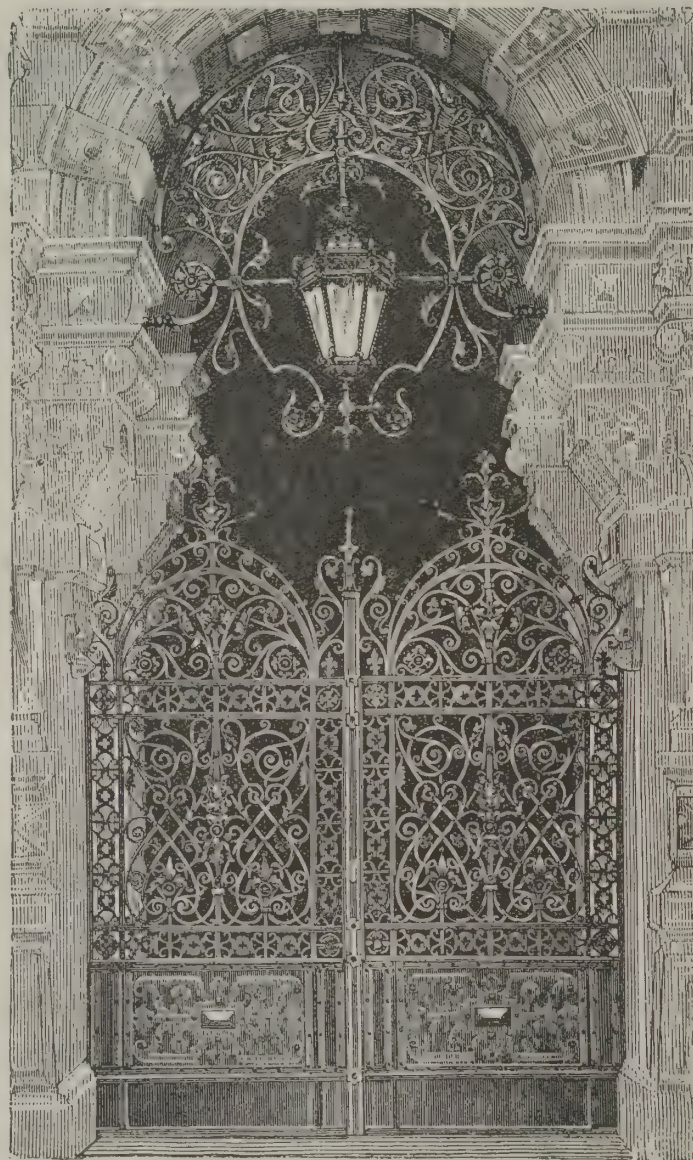
For inside floor painting, borders in fancy or plain colors can be introduced to relieve the monotony if desired. The centers of the rooms are the most walked upon, and the borders need not be made from the oxides of lead as a base. We would advise, however, as much of these used even there as is consistent with the possibility of making a given shade.—*House Painting*.

The Japanese House.

A Japanese house is full of emptiness, for the Japanese have learned the art of doing without. The floor, spotlessly clean, and covered with smooth padded matting, serves for chair, table, and bed; the wooden chopsticks dispense with knives, forks, and spoons, and the hibachi of hot charcoal is the substitute for fireplace, poker, and tongs. As the women wear no petticoats, bonnets, hats, gloves, boots, shoes, and stockings, nor jewelry, great wardrobes and chests of drawers for clothes are unnecessary, and as household and personal linen are not used, presses are not required. Thus a Japanese household is so arranged as not to need the services of the laundress, the chimney sweep, the knife and plate cleaner, the shoemaker, the bonnet maker, the glover, and, I should add, the window cleaner, for the outer walls and the partitions between the rooms of a Japanese house are made of panels which slide over one another, and are filled with translucent paper which admits light, and thus takes the place of glass windows.

One of the dainty cabinets which we are accustomed to treat in England as ornamental toys, and a small writing table about eight inches from the ground, are often the only articles of furniture in the room of the house of a wealthy owner. In a cupboard or double wall are thrown during the day the futons, or padded coverlets, which serve both as mattresses and bedclothes at night. In every room is found the tokonoma, or sacred recess, decorated even in the poorest houses with a vase containing a flower, and a kakemono or hanging picture, giving an impressionist sketch in black and white of a misty mountain or waving bamboo branches. In the tokonoma of the house of a wealthy person are hung the finest paintings, and here is also placed a gem or two from his art treasures, taken from his fireproof godown and changed from month to month.

In a Japanese room there is neither privacy nor comfort, and hence the screen becomes a necessity, both to give shelter from the draughts which traverse the room from all sides and some protection from the eyes of the curious. "To decorate construction, and not to construct decoration," has always been an axiom to the Japanese, as it must be to an art-loving people, and hence screen decoration has been an art to which the greatest painters—Korin, Tanyu, and Hokusai—did not hesitate to devote their talents, and screen decoration is still the subject to which the highest efforts of the art embroiderers are directed.



A WROUGHT IRON GATE.

priming nor filling it up as it should be; this requires the use of the best and truest talent in the shop. This dwelling so long upon the priming coat may seem absurd to many people, yet, if a whole number of the *Magazine* was given up to it and it would induce every painter that could be named to give the priming that due attention it should have, it would accomplish more good than a dozen numbers treating upon the subsequent coats of paint. The primary coat should have at least one week to dry before the next goes on to it.

It is now that the attention of the painter is required. If he wants a hard, durable paint, he must mix it to meet friction. White lead, zinc, the earth colors, will only stand a limited amount of it, and we must look to the lead oxides for it. The red oxide (red lead) and the yellow (litharge), either one of these or the two mixed together, must become the base of the paint. It is true that the range of shades will not be very great, but it is possible to vary the shades so as to harmonize with the balance of the painting on a building.

If shades of brown are wanted, a little white lead and black, or white lead, ocher, and black, will give a good variety, with red lead as the base. If buffs are wanted, add white lead to litharge, and you have them; the same with white lead and blacks will give dull, dirty grays, so that shades ranging through red and yellow browns, the red and yellow buffs, and the yellow grays and drabs can be made with these lead oxides as bases. Floors painted with such will stand a maximum amount of wear and tear. When two coats have been

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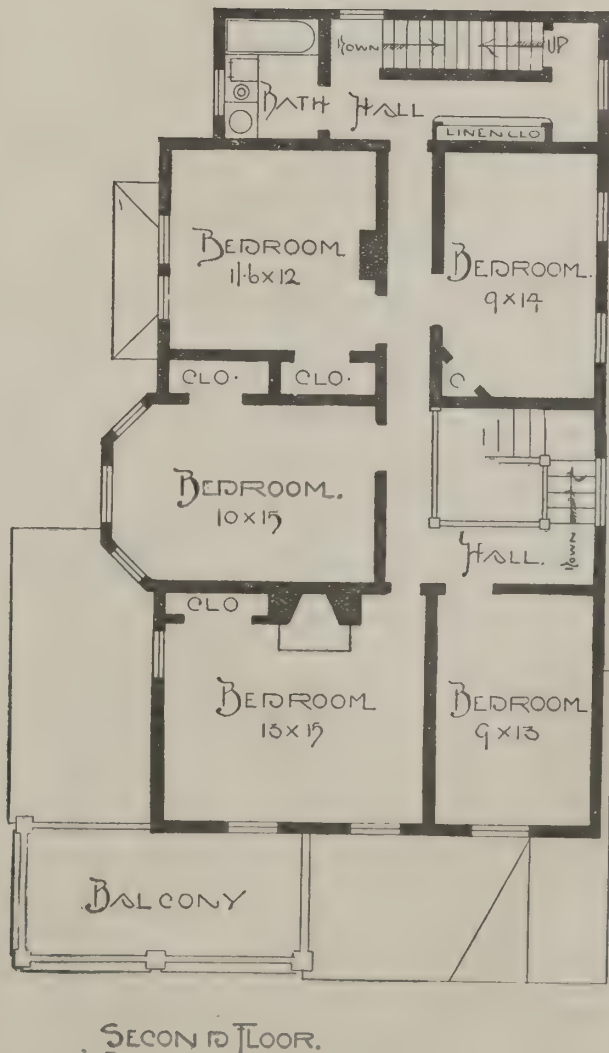
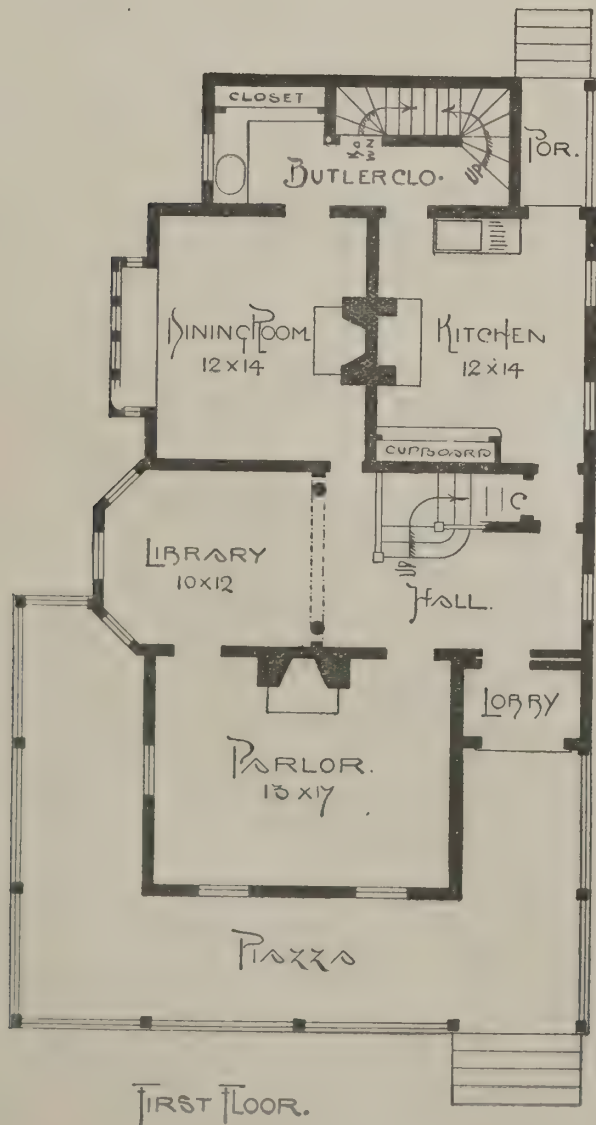
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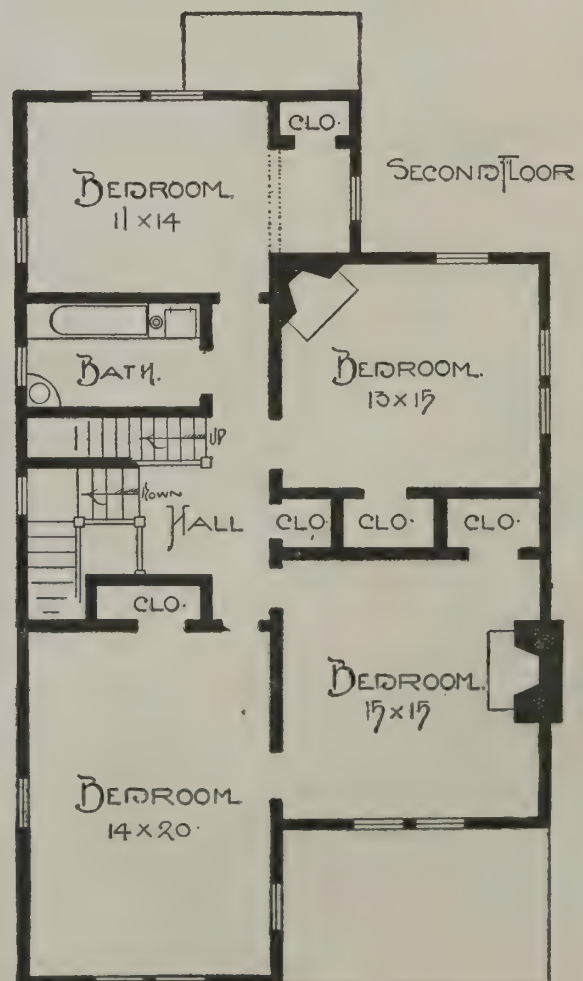
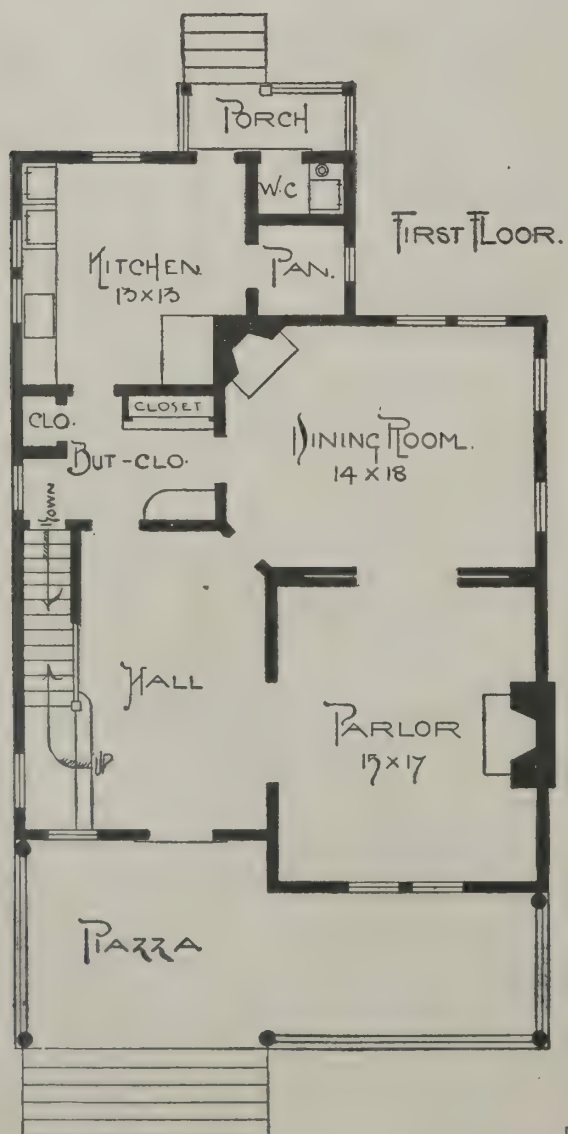
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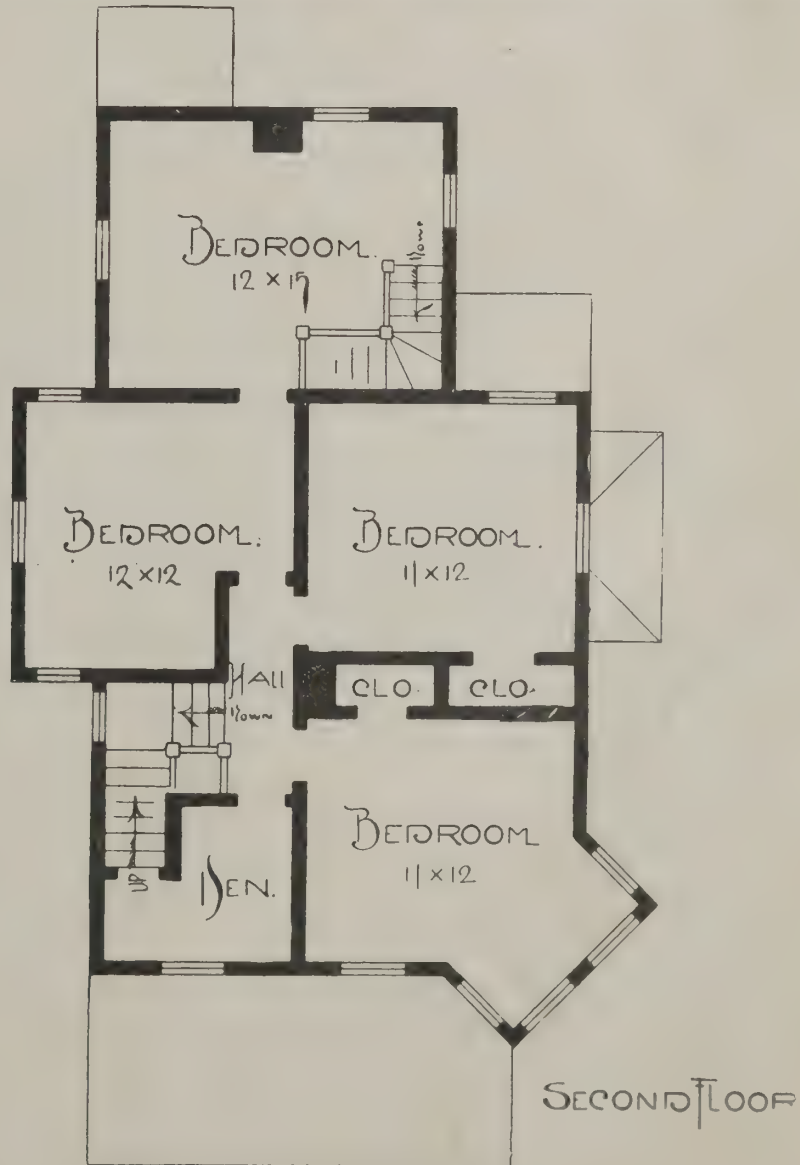
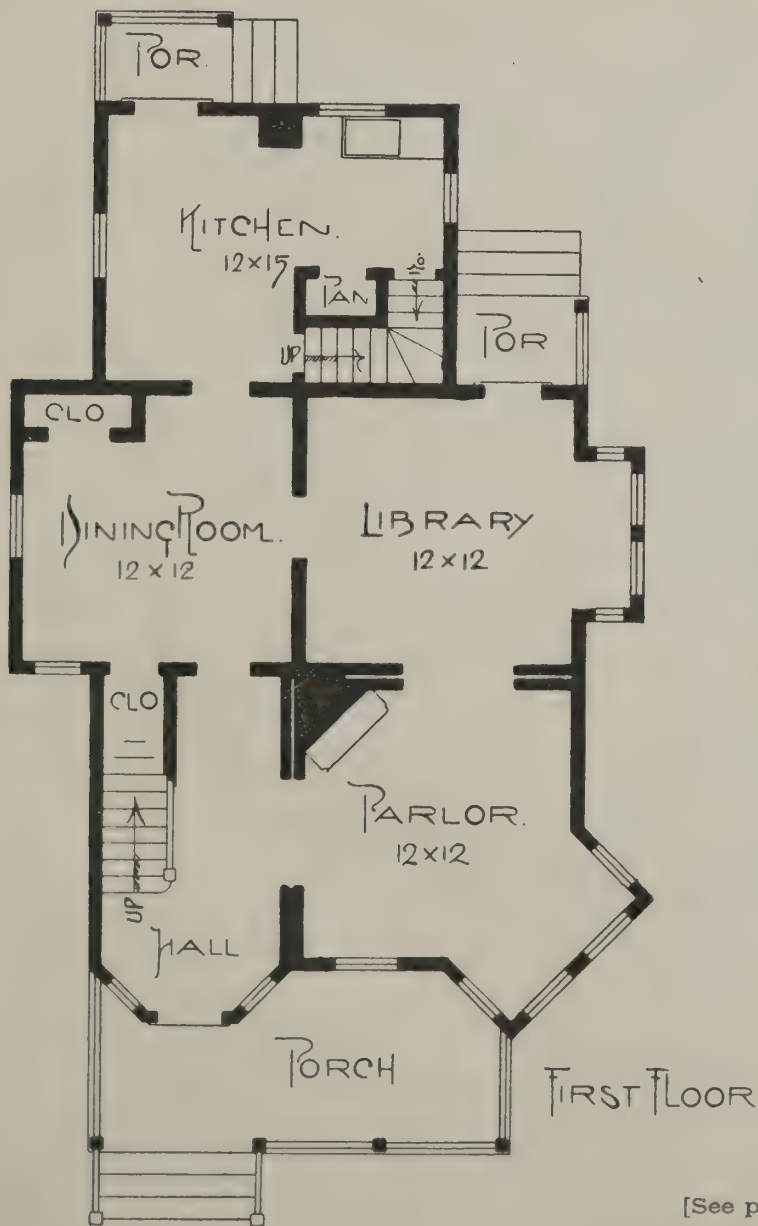
[See page 67.]

A COTTAGE AT CHESTER HILL.



[See page 67.]

A HOUSE AT FORDHAM HEIGHTS.



[See page 67.]

A COTTAGE AT ASBURY PARK.

A MEMORIAL CHURCH.

Our illustration herewith shows one of the designs sent in (in a limited competition) for the erection of the new Memorial Church which is to be erected at Colston Bassett, Notts. This was the accepted design, conditionally upon the work being carried out for the sum named in the competition. It is proposed to erect the church with rock-faced Coxbench stone on outside, with fine Hollington stone for all external dressings; the inside to have hammer dressed Coxbench ashlar, with Ancaster or Bath dressings; the columns carrying nave arches to be in white Mansfield stone; and for all steps, paving, etc., blue Yorkshire to be used. The roof will be covered with best pressed Staffordshire tiles, and oak-block flooring to floors of nave and transepts. Mr. Arthur W. Brewill, of Nottingham, is the architect.—*The Building News*.

The Postmaster-General's Bricks.

Some time ago he started a mission in one of the worst sections of Philadelphia. He wanted to build a large church, and while he was willing and able to contribute all the money that was necessary, he thought it would be a good plan to interest all the Sunday school scholars in the enterprise. With this end in view he told the school one Sunday "that he wanted each scholar to bring three bricks the next Sunday as his contribution to the new building. A brick, my children," he said, "will only cost a few pennies, and you can all deny yourselves some little thing to help along the good work, and please the God who has done so much for you." The next Sunday Mr. Wanamaker's face fairly beamed when he announced to the Sunday school that over 3,000 bricks had been contributed by the good boys and girls of the school. "Now try the same thing again," he said. "I am proud, very proud of you," but the next Sunday there was a cloud resting on the superintendent's face, for 30 of the "good little boys" had been arrested for stealing bricks, and the owners of the brick yards in that part of the city had waited on Mr. Wanamaker in a body and demanded that he should cancel his request for bricks, as his scholars were stealing every one they could lay their hands on. It was a great shock to Mr. Wanamaker; the request was canceled, and the church built on the good old-fashioned plan. The story of "Wanamaker's bricks" is often told, and it is said the Postmaster-General enjoys the telling of it himself as much as anybody.

Architecture in Relation to Hygiene.

Dr. B. W. Richardson, who stands in the foremost ranks of sanitary authorities, delivered a lecture upon this subject. He began by showing that much prejudice has been excited against some of the best sanitary inventions and labors, because leading sanitarians have failed to consider artistic construction as part of sanitary construction; their whole minds have been absorbed in the useful, and they have permitted all that is ornamental to pass by, as if good taste were disconnected from sanitation. He argued that this was a grand mistake; that ugliness was an offense to good health, and that beauty was an aid to the best health. He showed that when mind and body are enfeebled by bad health, the introduction of disagreeable objects

into the sick room or ward is painful and injurious to the occupants; while the presence of beautiful flowers, pictures, and designs is curative in its effects—a kind of mental tonic giving tone also to the body. This thought led him to the consideration of the best forms for hospital wards, having regard to the effect on the eye, and through the eye on mental and bodily health, and so with all the details of visible construction and of decoration. Speaking of the dwelling house, he maintained that no part ought to be excluded from the possession of architectural art, because it is the

"What is the relation of architecture to hygiene?" but even when writing in the interests of art, he is naturally first of all a man of science.

Fireproof Buildings.

A practical builder, in the *Philadelphia Record*, gives the following views on this subject: The invention of so-called hollow bricks has produced a means by which houses may, with proper precaution, be rendered impregnable to the devouring element. Of course, if a building is to be quite fireproof it must be constructed of materials that are not only incombustible, but also perfect in respect of tenacity and durability when subjected to excessive heat. For this purpose we must suppose the outer wall of our model house to be of brick, and while iron will, of course, remain essential for girders, columns, and beams, these must be incased in two or three inches of burnt clay material, so that every particle of iron work shall be covered. This brick work is thoroughly fireproof, but to insure still greater security the bricks must contain cavities in their centers, which will not only increase their lightness, but, by furnishing air ducts, act as insulators that will stay the progress of heat.

The partitions of this ideal building must rest on fireproof floors and be made of burnt clay blocks. Furring blocks of the same material must be substituted for the usual wooden furring along the inside of the exterior walls, and the roof must be of thick, porous terra cotta bricks. The floors are, of course, a very important feature of the structure; but if they are made of rolled iron beams, properly spaced and thoroughly protected by hollow burnt clay arches, I warrant they will be absolutely invulnerable. Wood work, of course, may catch fire; so may the curtains, carpets, chairs, tables, and what not that fill the room. But it will be impossible for the flame to spread.

But there's still another and equally valuable virtue in hollow bricks. It is the immunity from cold and dampness which a building thus constructed enjoys. The air cells in the center of every brick absolutely prevent rain or moisture from permeating the walls.

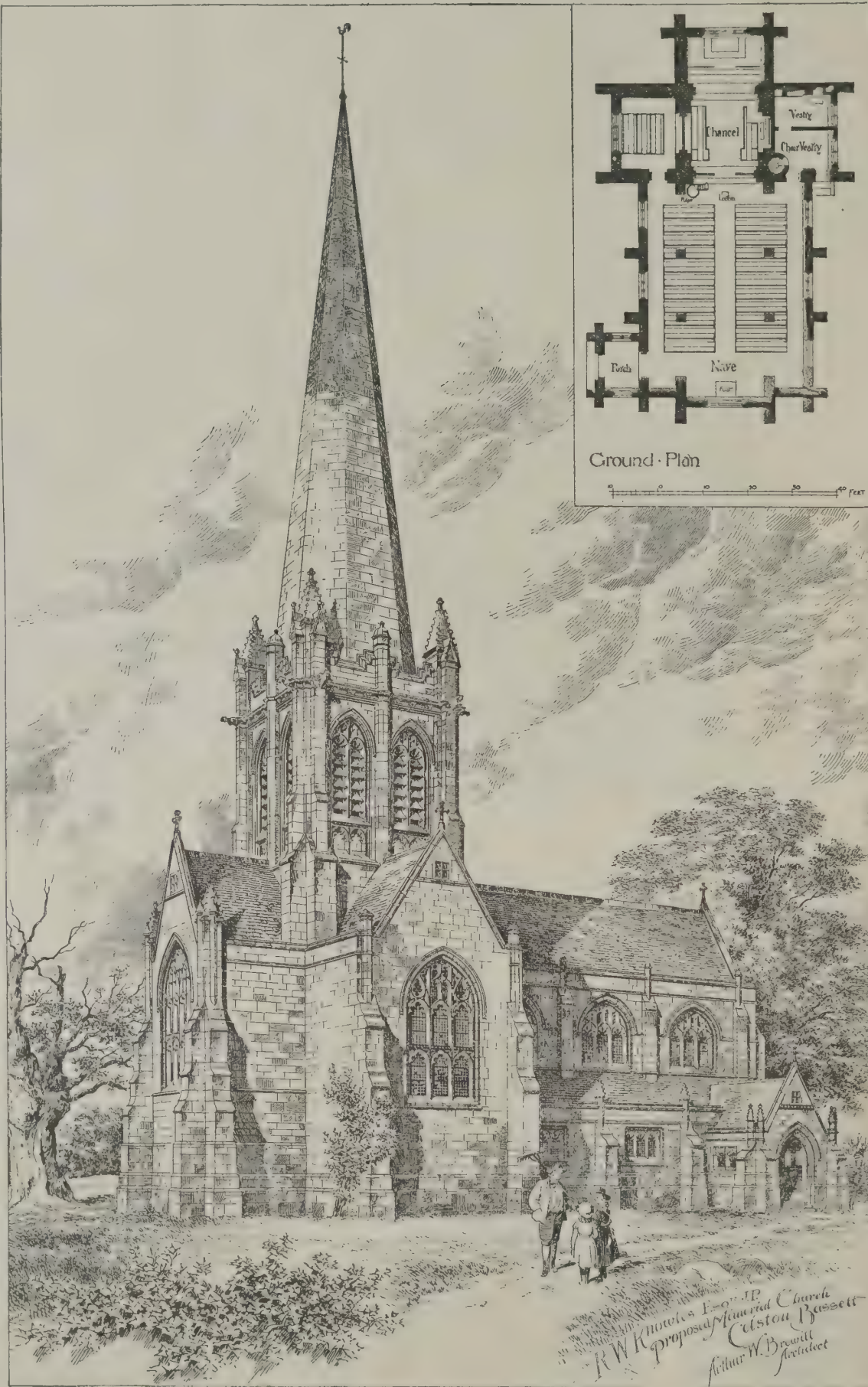
One thing more, these bricks are impervious to sound. The tones of tinabulating pianos and mediæval hand organs can never penetrate through hollow bricks.—*Ins. Mon.*

AN oil running a heavy Corliss engine would not

do to run a spindle or a fast-revolving dynamo. The former runs slowly and has great pressure and strain on its journals, and consequently requires an oil which will not spread too quickly, but with low gravity and high viscosity. The latter needs a pure mineral oil, viscous and quick to enable it to enter into the closest parts of the bearing as rapidly as the speed at which it revolves necessitates.—*F. A. Kukne.*

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.



A MEMORIAL CHURCH.

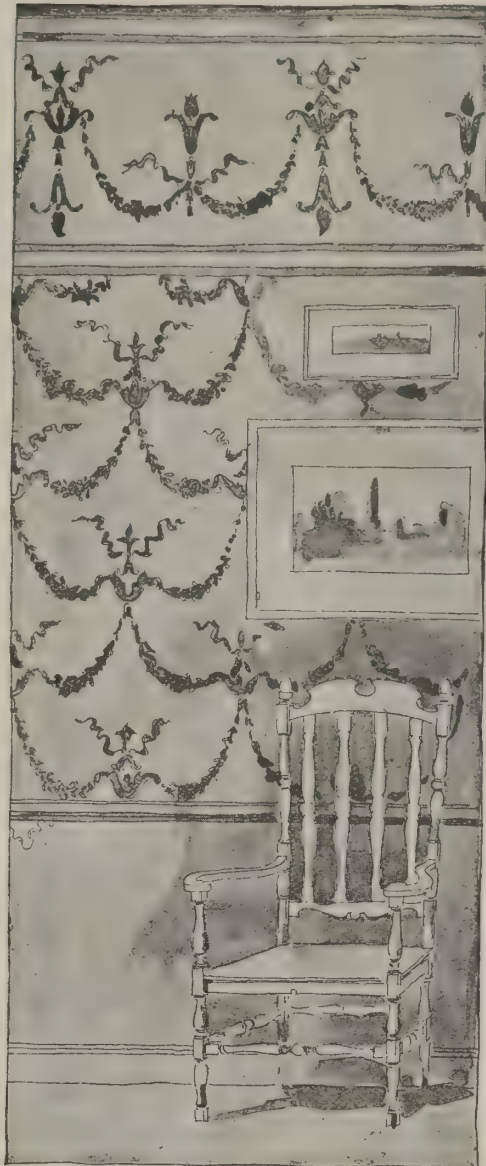
tendency of the human mind to let that which is disagreeable, plain, and ugly go without regard, and accumulate dirt and disorder. Hence all the offices of a house should have as much care bestowed on them as the living rooms to render them bright and cheerful, and to make cleanliness as obvious a necessity in one as the other. In this lecture Dr. Richardson made a great point of the treatment of floors, adverting particularly to the ancient Roman mosaic floors, which were not only beautiful works of art, but easily cleaned, and by the well known hypocaust system of warming diffused an equable and agreeable warmth through the room, without draughts. Other points especially dwelt upon were the treatment of roofs and the introduction of artistic water fountains in different parts of the house. No one could be found better qualified than Dr. Richardson to speak with authority on both the æsthetic and the scientific aspects of the question

SOME NOVEL EFFECTS IN PAPER HANGINGS.

The accompanying illustrations will attract the attention of house decorators and artists, as showing what can be done in the preparation of artistic paper hang-



"ROCOCO" WITH "BIRGE SCINTILLARE."

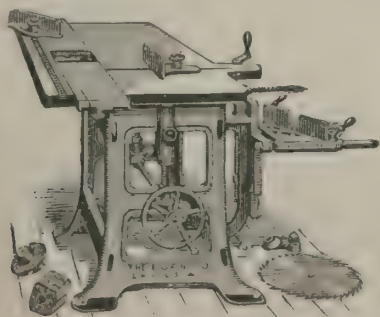
BIRGE SPECIAL DESIGNS IN PAPER HANGINGS.

"COLONIAL" ORNAMENT PAPER HANGINGS.

ings. They represent some recent specimens of the manufacture of M. H. Birge & Sons, of Buffalo, N. Y., whose catalogue presents a large number of original designs and colorings. Our illustrations show two new combinations of these paper hangings: One designed and colored in the style of the "Empire" (shell-like ornaments, with flowers and vines depending from them), which would be beautiful and appropriate for the drawing-room, reception-room or parlor. The other is a "Colonial" design, and very fitting for the decoration of the interiors of the many houses in late years finished in this style. The patterns shown in both designs are made and colored in sets; a sidewall, frieze and ceiling pattern, all designed and colored by skillful interior artists, to be used together for the entire decoration of an apartment. The school or style of ornament is preserved throughout in these combinations of papers, so that a person unskilled in decoration, by applying these patterns as designed, can produce the decorative effects of the most advanced artists. Through ingenious patented methods of stamping and embossing, this firm has obtained some very striking effects representing moire satin and other textile fabrics, velours, etc., in which the paper has the appearance of the most expensive silks and damasks.

AN IMPROVED WOOD-WORKING MACHINE.

The illustration represents a recent type of machine, known as the variety wood-worker, for use in wood-working establishments, capable of use as a fine cross cut saw and a first-class rip saw. It is designed to make miters and bevels, and splits lumber up to 10 in. wide, and by turning over to 20 in. wide. It is also a groover and superior panel raiser, and a planer and jointer on stuff up to 5 in. wide, while it may be used

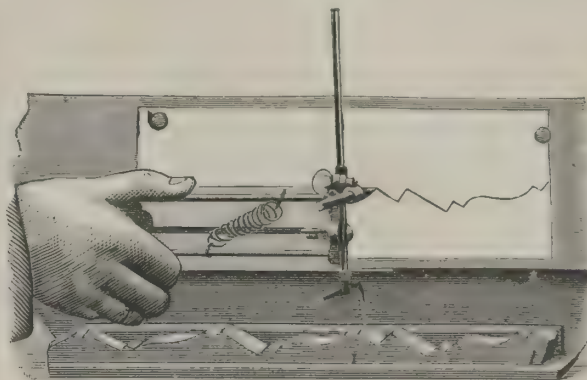


UNIVERSAL RIP AND CROSS-CUT SAW.

as a horizontal boring machine with adjustable table. For further information, address the builders, The Egan Company, Nos. 209 to 229 West Front Street, Cincinnati, O., U. S. A.

AN IMPROVED MECHANICAL STYLUS.

The scriber shown in the cut, for carpenters, joiners, stairbuilders, and mechanics and artisans generally, is an improved device for obtaining, in a simple and



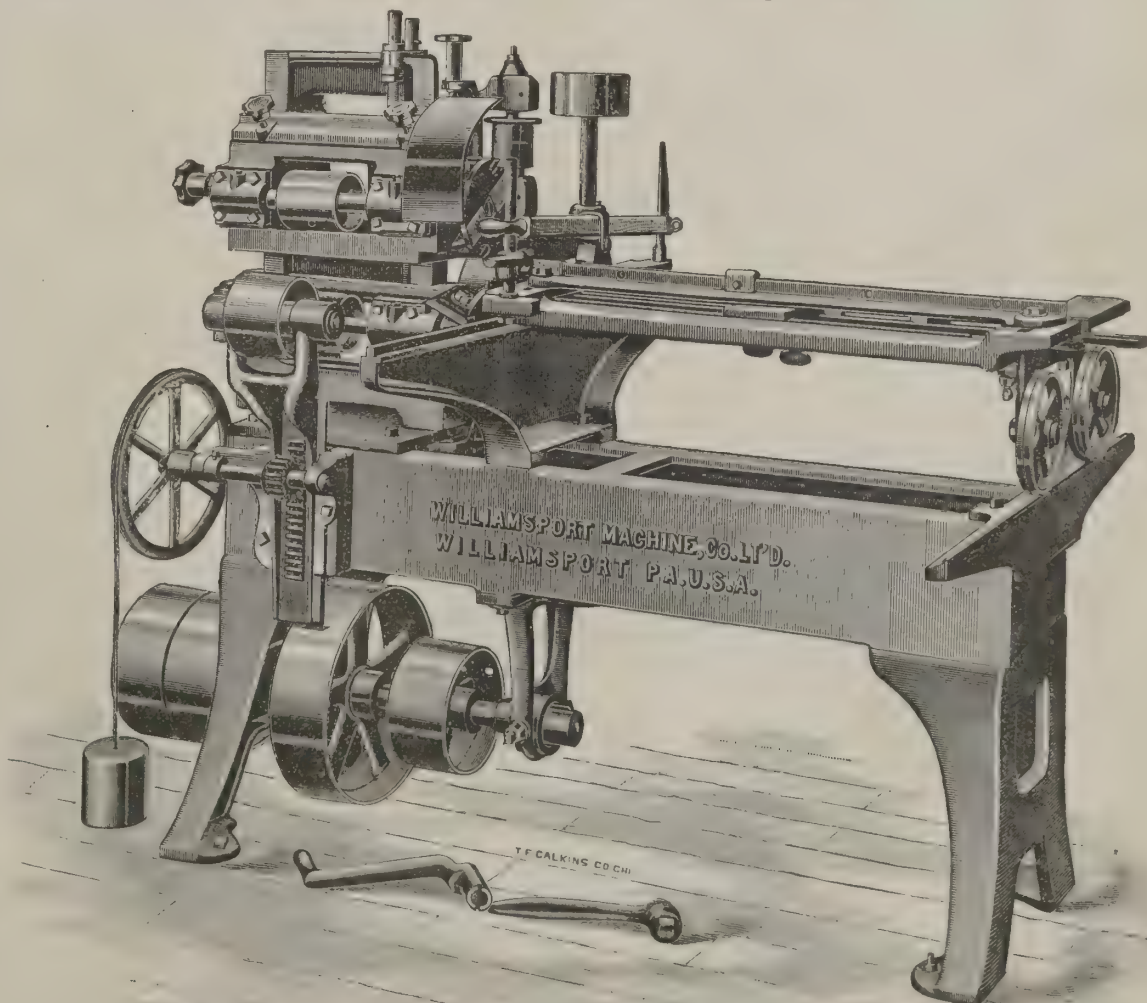
POTTER'S PATENT SCRIBER.

ready manner, an exact facsimile of the profile of any moulding, panel ornament, etc., in order to make possible its perfect reproduction in a piece of new work, saving time and labor and insuring just the results sought every time. Messrs. Kolesch & Co., 155 Fulton Street, New York City, are selling agents for this device.

AN IMPROVED TENONING MACHINE.

The accompanying illustration represents a new tenoning machine especially designed for sash, blind, and furniture work. The working parts of the machine are mounted on a substantial iron bed. The yoke or frame carrying the two head stocks has been designed and arranged to produce the most accurate results in adjusting to different thicknesses of tenon. The cope frame is attached to the head stocks and moves with them. The table is so arranged as to afford the easiest possible movement to the operator, and the countershaft is attached to the machine. The bottom head stock has an independent vertical adjustment to obtain the desired thickness of tenon. The top head is also provided with an independent adjustment. The copes are properly connected to the head stocks, and contain within themselves all the adjustments, both lateral and vertical, for any range of work. The machine will make a tenon $3\frac{1}{2}$ inches long at one cut, and, by passing the work through twice, the tenon can be increased to 6 inches. Countershaft has tight and loose pulleys, 10 in. diameter, 4 in. face, and should run 900 revolutions per minute. Belts required: One head belt, 9 ft. 8 in. by $3\frac{1}{2}$ in.; one cope counter belt, 6 ft. 7 in. by 3 in.; two cope belts, 5 ft. 9 in. by 2 in.

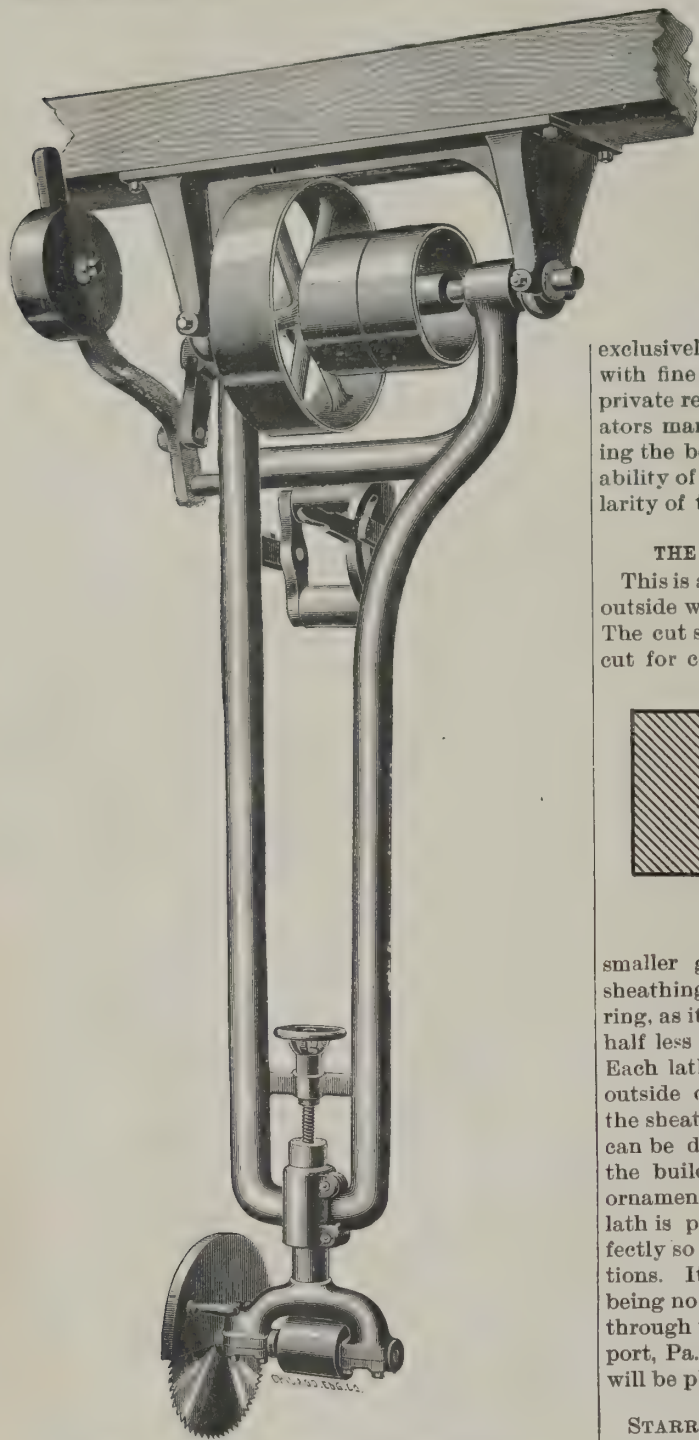
This machine embodies many recent improvements, and is manufactured by the Williamsport Machine Co., Limited, Williamsport, Pa.



AN IMPROVED TENONING MACHINE.

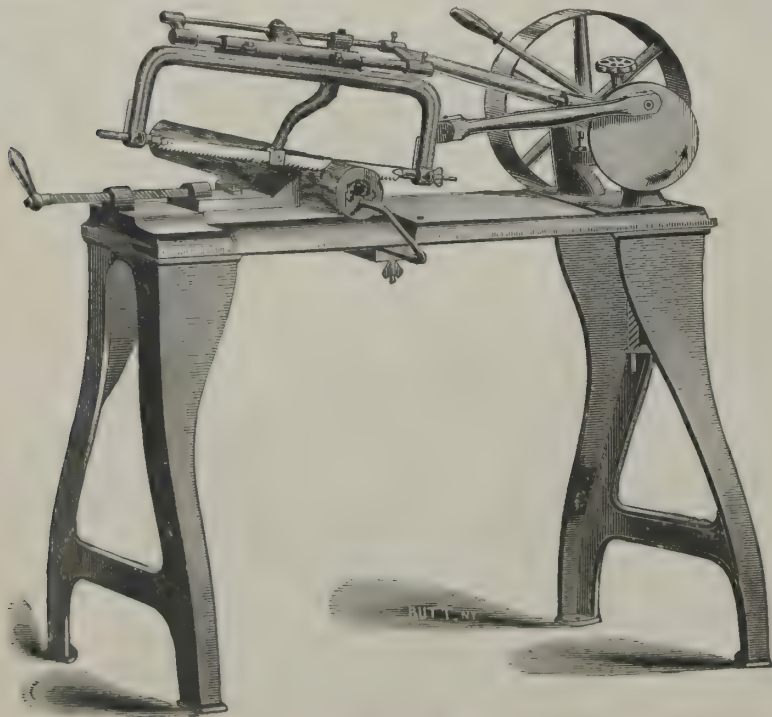
AN IMPROVED SWING CUT-OFF SAW.

Complaints of the frailty and inadequacy of swing cut-off saws have been frequent in the past, and the Indiana Machine Works, of Fort Wayne, Ind., have, therefore, constructed a new machine, shown in the



AN IMPROVED SWING CUT-OFF SAW.

illustration, that will attract much attention. The frame is cast iron, cored out, and is very wide at top bearing, which makes it impossible to get out of line. The counterbalance weight is adjustable, and is a great labor-saving device, aiding the workman, as it does, both ways, and when the cut is made, swings the saw back clear of the lumber without any effort on the part of the operator. The vertical adjustable arbor is a new feature in this class of saws. The stem of yoke is turned true, and has a planed key-way into which a feather is fitted; hence the saw is always square with



POWER HACK SAW.

the table. The extreme adjustment is five inches, making it possible to change saws from a large, coarse blade to a small, fine one, or *vice versa*, to suit the work in hand, and also to wear saws smaller than on the ordinary machine. The double tightener is provided to take care of slack in belt. The machine carries a 16 inch saw. Weight, 750 pounds.

For further particulars relative to this and other modern wood-cutting tools, address the Indiana Machine Works, Fort Wayne, Indiana.

STEAM AND WATER RADIATORS form the subject of a handsome quarto volume just issued by the Pierce Steam Heating Co., of Buffalo, N. Y., the book giving fine illustrations and ample description of the great variety of this kind of work manufactured exclusively by this company. It is also embellished with fine illustrations of many notable buildings and private residences in which the steam and water radiators manufactured by the company are used, affording the best of evidence of the enterprise and business ability of the company, as well as of the great popularity of the Pierce radiators.

THE BYRKIT-HALL SHEATHING AND LATH.

This is an article for plastering on either inside or outside work and with any kind of plaster or cement. The cut shows exact size of 6 in. board having grooves cut for common mortar; for cement plaster a much



THE BYRKIT-HALL SHEATHING AND LATH.

smaller groove is made. It is claimed that this sheathing and lath is cheaper than lining lath and furring, as it combines all three and in addition takes one-half less mortar and saves much time in putting on. Each lath is nailed at each stud. The moisture from outside comes against the solid wood at the back of the sheathing lath and cannot get to the plaster. Nails can be driven anywhere without reference to where the builder put a stud, and pictures, mouldings, and ornaments can be put where desired. This sheathing lath is practically a deafener, and can be made perfectly so by placing joist and studs to break connections. It makes a slow-burning construction. There being no spaces between the lath, there is no draught through the plaster. Mr. H. W. Jenkins, of Williamsport, Pa., is the Eastern agent of the company, and will be pleased to furnish any information desired.

STARRETT'S CATALOGUE AND PRICE LIST of fine tools for mechanics cannot fail to receive careful consideration at the hands of every expert worker in wood or metal into whose possession it comes. The tools shown are all designed to be of the very best manufacture, and to be absolutely depended upon in the execution of the finest work. Those interested should send for a catalogue to L. S. Starrett, Athol, Mass.

POWER HACK SAW.

The Millers Falls Company, of 93 Reade Street, New York City, have recently introduced the power hack saw shown in the illustration, and it is said to be giving the best of satisfaction. It is a powerful machine for sawing steel and other metal bars, and is adapted to be run by a belt. It cuts a steel bar up to five inches in diameter, and will be found useful in machine shops. It can also be used for cutting railroad rails. It runs at the rate of forty strokes a minute; the speed and pressure are uniform, and it requires little attention.

THE Chattanooga, Tenn., branch factory of the Cambridge (Ohio) Roofing Co. report an increased demand for their patent steel roofing, for factories, cotton gins, compresses, etc., and parties in the South interested in the erection of such buildings will do well to address this company for their illustrated catalogue, samples, and prices.

THE SAFETY FURNACE PIPE CO., of Detroit, Mich., manufacture a hot air pipe which is convenient to handle and put in place, and economical in conducting heated air, as every section and part is double,

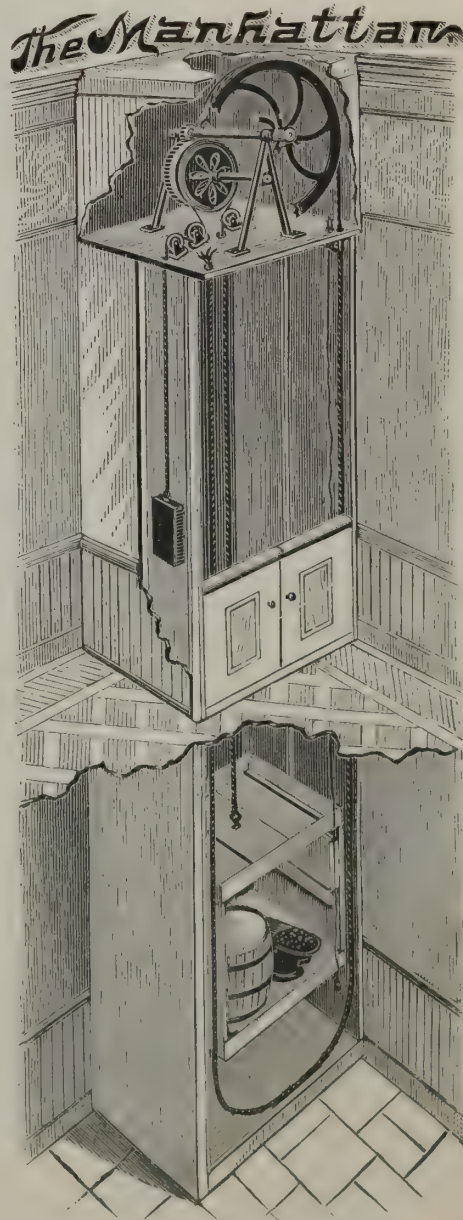
and fitted with slip and socket joint. The pipe is so constructed that air passages run for its entire length between the inner hot air duct and the outer casing, the cold air being supplied to these passages through a novel form of foot-piece, and taking up the heat radiated from the hot air duct, the use of this air in the register box also promoting thorough ventilation.

"LIGUISTRA" is the name of a new article just put on the market as a substitute for plaster and other materials used for interior decorations. It is hard, and becomes harder with age, taking a fine finish and polish, while it can be nailed, sawed, planed, bored, and worked with tools the same as wood. It is furnished in sheets of different sizes, at a price of four cents a square foot and upward, and a large number of ornamental patterns are kept. This new material is a product of the American Straw Board Co., a great corporation operating nearly all the straw board mills of the country, and having its general offices in the Pullman Building, Chicago.

AN IMPROVED DUMB WAITER.

One of the chief essentials in modern houses is a first-class, easy-working dumb waiter. Not only is this true in private houses, but it is especially so in tenement and apartment houses where heavy substances are to be lifted, and where the buildings are many stories high. Among the best of these devices is the Manhattan dumb waiter, manufactured by the Storm Mfg. Co., of Newark, N. J. The company are also the

makers of the New York Safety dumb waiter, which has been before the public for several years, and which has a world-wide reputation. The Manhattan dumb waiter differs from the New York Safety in that it is a geared machine, and while it is of quick speed, it also has a capacity for lifting comparatively heavy loads. These machines have a guaranteed lifting capacity of 200 pounds, and many of them have been substituted in place of elevators for light work in factories where the load to be lifted does not exceed the above mentioned weight. Full information regarding them, and prices, may be had from the manufacturers.



THE MANHATTAN DUMB WAITER.

SCIENTIFIC AMERICAN

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AND BUILDERS

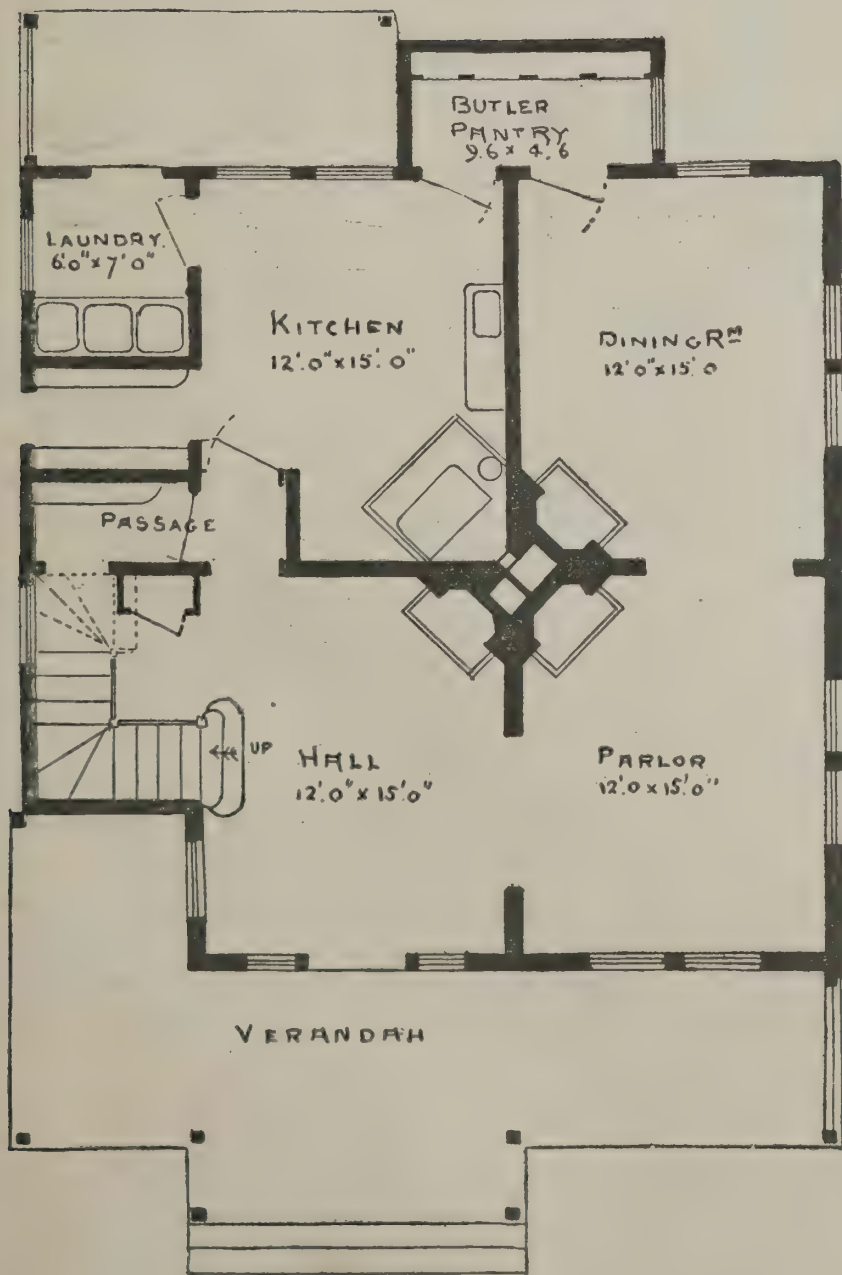
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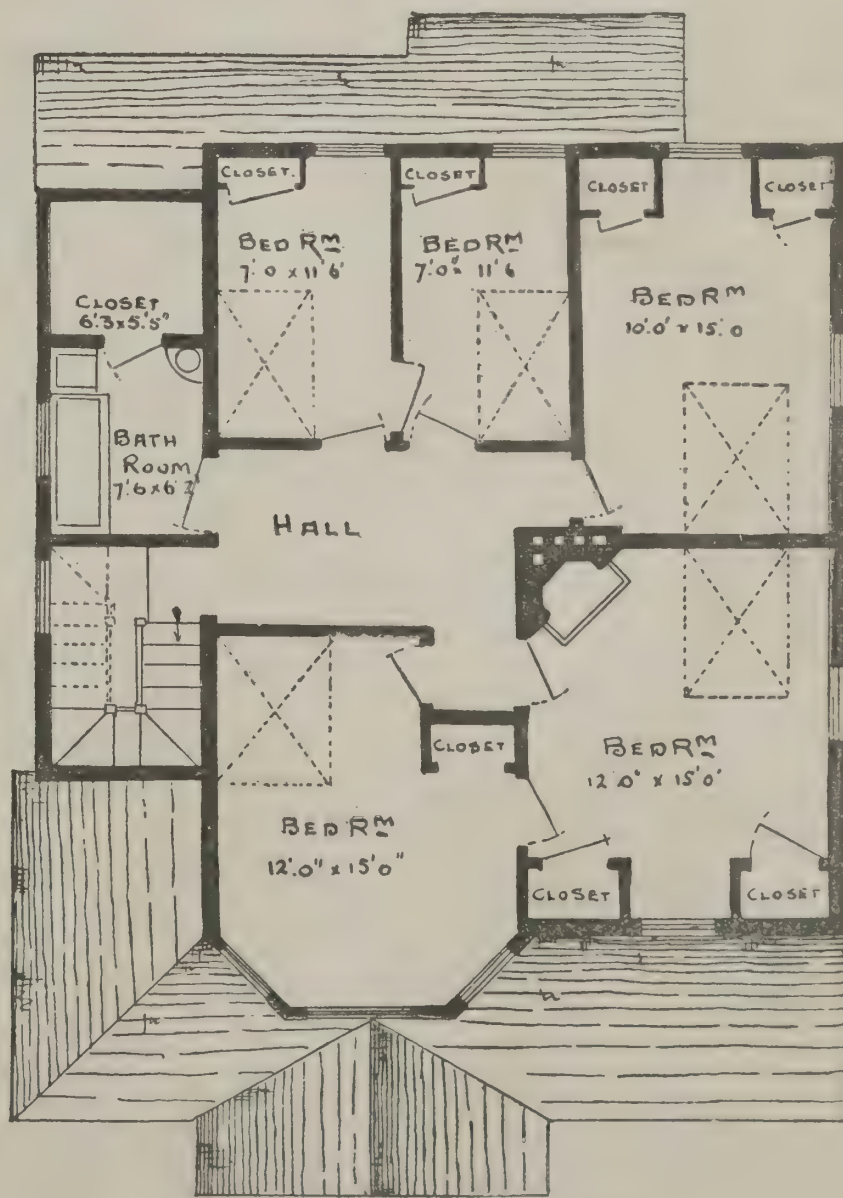
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No. 6.



FIRST STORY PLAN



SECOND STORY PLAN

A THREE THOUSAND DOLLAR COTTAGE.

[See page 82.]

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors,

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

NEW YORK, DECEMBER, 1891.

THE

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ARCHITECTS AND BUILDERS EDITION.

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This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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READ THIS WITH CARE.

The present number completes another year in the history of our publication and closes the volume. We are not in doubt as to the utility of our publication. The affirmative evidence is overwhelming. Go where you will throughout the length and breadth of this great country, and on every hand will be found new and tasteful buildings, the counterparts of which were given in the SCIENTIFIC AMERICAN, from which they were planned and erected.

No publication has ever been issued in the architectural line from which so many dwellings and homes have been chosen and built. The reason is simple. In every number we place before the reader a variety of new plans and designs of the most practical nature. Not fancy sketches, of which there can be doubt as to realizing the details when the work of building is begun; but actual plans and perspectives of the latest designs of houses already erected. In almost every instance the plans we publish are produced from the buildings themselves, the perspectives being from photographs specially taken by our own artists. Therefore, when a plan is chosen from the SCIENTIFIC AMERICAN the builder knows that it is practical. The exact details, form, proportion, dimensions, arrangement of everything, stand before the eyes, ready for the closest measurement and the most careful study.

Every family having in contemplation the building of a home should, as a matter of economy, possess this most valuable work, for in its pages, at the low cost of \$2.50 a year, they have before them the best perspective examples of existing dwelling houses and the most fresh and approved interior plans therefor. This will be a great aid in selecting and deciding upon the character of the intended home, besides saving them time and money.

As to the value of this periodical to builders and architects, it is needless to dwell. It speaks for itself. What signifies to them the trifling sum of \$2.50 a year, for a helper in the plan and perspective line that is so sure to aid them in closing valuable contracts amounting to hundreds and thousands of dollars?

The special object of these remarks is to remind our present readers of what we are doing for them, and to ask them, now at the threshold of the time when new subscribers are to be gathered in, to speak good words for us among their friends, thereby encouraging us and promoting the extension of our work.

A COTTAGE FOR \$3,000.

The engravings on page 81 represent a comfortable cottage estimated to cost \$3,000. Drawn by A. F. Licht, architect, New York.

A COTTAGE FOR \$800.

One of our plates in colors this month illustrates a dwelling erected for Mr. A. R. Doten, on Great Diamond Island, near Portland, Maine. The design is excellent and it combines both beauty and convenience. It has a spacious piazza, a loggia, at second floor, and contains eight good sized apartments. Foundation posts on stone footings, inclosed for storage. The exterior framework throughout is sheathed, and then covered with shingles, stained sienna. Roof, shingled, and painted red. Dimensions: Front, 28 ft. 6 in.; side, 28 ft. 6 in., exclusive of piazza. Height of ceilings: First story, 8 ft. 6 in.; second, 8 ft. The interior walls and partitions throughout are of beaded white pine, smooth and clear and finished natural. Living room has an open fireplace, built of brick, with hearth laid with same, and is provided with a neat wood mantel. Hall contains a staircase neatly turned out of whitewood. Dining room is provided with a buffet window glazed with stained glass. Kitchen and pantry are fitted up replete. Second floor contains four good sized bedrooms and closets. Cost \$800 complete. Mr. Antoine Dorticier, architect, Portland, Maine. Our plate was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT MT. VERNON, N. Y.

We give a plate in colors of this beautiful residence and a second view in perspective on p. 91. It is the home of Charles A. Tier, Esq., at Chester Hill, Mt. Vernon, N. Y. The design has a very picturesque exterior and is of a very substantial construction, with a roomy interior. The first story, built of Tuckahoe marble, harmonizes nicely with the soft silvery tone of the shingles that cover the second story, which are left in their natural state so as to weather-stain. Roof, covered with octagonal cut slate. Dimensions: Front, 44 ft.; side, 56 ft., exclusive of piazza and porte-cochere. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. The convenience of this house is apparent, as a study of the plan will show, and the several rooms communicating as they do make a most attractive vista of the entire floor. The first floor is handsomely trimmed with antique oak highly polished. Lobby has a tiled floor. Hall is wainscoted and provided with an ornamental staircase, with carved newels, and is lighted with stained glass window. Fire-

places, built of brick, have hearth laid with unglazed tiles and oak mantels of excellent design. Dining room has a window seat and nook for buffet. Kitchen is wainscoted and trimmed with yellow pine finished natural and is well provided with pantries, closets, dressers, sink and range, fitted up in the best possible manner. Second floor is trimmed with whitewood, stained and finished in cherry. It contains three bed rooms, billiard room, den and bath room. There are two bed rooms on third floor, besides ample storage room. Cemented cellar contains laundry, furnace and other apartments. Cost \$8,500. Mr. F. Carlos Merry, architect, of 83 Fulton Street, New York. Our engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL HOUSE.

We publish on page 84 a residence, colonial in treatment, erected for Charles H. Ostrander, Esq., on Chester Hill, Mt. Vernon, New York, from plans prepared by Louis Herbert Lucas, architect, same place. The design is excellent. It has a pleasant piazza and bay windows. The underpinning is built of rock-faced bluestone. The first story is clapboarded, second and third stories shingled, and all painted colonial yellow, with ivory white trimmings. Roof slated. Dimensions: Front, 36 ft.; side, 53 ft., exclusive of front piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. There is a well lighted cemented cellar under whole of house, and it is provided with laundry, furnace, coal and food rooms and other necessary apartments. The plan is unique, and a glimpse of the entire floor is obtained immediately upon entering. Lobby has a tiled floor and Dutch doors, with quaint windows on either side. Hall, parlor, and library are finished in old ivory white, and the dining room is trimmed with whitewood, stained and finished in mahogany. Hall contains a staircase of unique design, being copied from a similar one in the house of Henry W. Longfellow. It is painted similar to other woodwork, except the handrail, which is of mahogany, and is lighted effectively with a large stained glass window. Floor of hard wood, laid in narrow widths. Parlor has a chimney breast with tiled hearth and facing and an exquisite mantel made from a special design. Library has an open fireplace built of brick, and fitted up similarly to the one described. Kitchen and pantries are trimmed and wainscoted with whitewood, finished natural, and are replete in all their various appointments. Second floor is trimmed with whitewood, stained cherry, and it contains five bed rooms, large closets, and bath room. There are two bed rooms and billiard room on third floor. Cost, \$8,000, complete.

Our engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT MONTCLAIR, NEW JERSEY.

We publish on page 85 a dwelling containing twelve rooms, erected for Mr. P. H. Van Riper, at Montclair, New Jersey. Dimensions: Front, 32 ft. 6 in.; side, 44 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The underpinning is built of brick, with the building above of wood, covered with clapboarding and shingles, and painted yellow, with light brown trimmings. Roof, slated. The plan, which presents a spacious interior, also shows an abundance of piazza room and balconies. The interior throughout is trimmed with whitewood finished natural. The doors and windows have beaded casings and turned sunk angle blocks. Hall contains an ornamental staircase, turned out of ash, with a window on landing glazed with stained glass. Sliding doors connect the principal rooms on first floor. The fireplaces in parlor and dining room are furnished with tiled hearths and hardwood cabinet mantels. Kitchen is wainscoted and provided with sink, range and large well fitted up pantries. There are four bed rooms and bath room on second floor and four bed rooms on third floor. These apartments are trimmed with wood similar to first story and are fitted up replete. Cemented cellar contains furnace, laundry and other necessary apartments. Cost, \$3,500 complete. Mr. W. Q. Lockwood, architect, same place. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.

A PARISIAN ORIEL.

We give from *La Semaine des Constructeurs* a design of an ornamental oriel or bay window, from a dwelling on Kleber Avenue, Paris, M. Gaillard, architect.

The Education of Customers.

This country is well supplied with architectural papers, many of them ably conducted, of superior value as instructors of architects, exhibiting the theory, mathematics, principles, practice, rise and progress of architecture from the earliest ages. The aggregate circulation of these works is quite limited, being confined chiefly to purely professional architects, a comparatively small class, comprising throughout the entire country probably not over three thousand. The *SCIENTIFIC AMERICAN* occupies quite a different field. It aims principally to educate the customers of architects and builders. This it accomplishes by placing before them a constant succession of fresh and splendid illustrations of attractive buildings and plans. The beneficial influence of this method is very great, very practical, and is sensibly felt by architects and builders in all parts of the country. Their services are in greater demand because their customers, no longer satisfied with cheap and ordinary buildings, now ask for the latest, the newest, and the best designs, such as the *SCIENTIFIC AMERICAN* brings to them.

Our paper goes to the masses of the people, who love to look at and study the representations of good buildings.

Where the *SCIENTIFIC AMERICAN* freely circulates, there architects and builders thrive; there property is intelligently improved; and everybody knows that property, if attractively improved, is increased in value.

The *SCIENTIFIC AMERICAN* has by far the largest circulation of any architectural paper in the world, because it not only goes to architects and builders, but also to their customers, who vastly exceed the former in number.

This, also, is the reason why the *SCIENTIFIC AMERICAN* has the largest advertising patronage of all the architectural papers. It is these customers who order and pay for the plans, and the buildings, and the plumbing, the painting, the hardware, the walling, the papering, the heating, the lighting, the decorating, the finishing, the furnishing, and every other blessed thing that is used or placed within or without the building. "We get good returns for money spent in the *SCIENTIFIC AMERICAN*," say advertisers, and that settles the question.

When our builders' edition first appeared, nearly all the architects were down upon it. They said we gave away their plans free to the public, and the effect would be to take bread from their mouths. But they now find, by actual experience, they were mistaken. The *SCIENTIFIC AMERICAN* promotes their business by educating their customers, and creating a demand for the higher and more profitable class of plans and designs.

COTTAGE AT PORTCHESTER.

We publish on page 86 two floor plans and a view of the above cottage. The basement story is built of stone, showing on elevation coursed rubble. The second story is built of frame, covered with shingles; the first story is also built of frame, but covered with clapboards. There is a little half-timbered work introduced on the elevations; that is the solid frame showing and the spaces between filled in with rough cast work. The parlor is 13' x 16' and the bay is 13' x 13', being arched from the parlor proper, and forms a very pleasant feature in the room. The dining room, 15' x 18', and connected by means of sliding doors, has a long, flat bay window, and is conveniently situated with the kitchen. On the second story we get six good bed rooms, provided with ample closet room and a toilet room 7' x 14'. The estimated cost of this cottage is \$4,200.

Our engraving was made direct from a photograph of the building taken specially for the *SCIENTIFIC AMERICAN*.

A RESIDENCE AT BENSONHURST.

The engraving on page 87 illustrates a dwelling erected for Clarence H. Eagle, Esq., at Bensonhurst, Long Island. Dimensions: Front, 38 ft.; side, 44 ft., exclusive of piazza and porch. Height of ceilings: cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. Underpinning, local brick laid up in red mortar. First story is clapboarded and painted light olive green; second and third stories are shingled and left to weather stain, while the blinds and trimmings are painted bottle green. Roof shingled. The entrance hall is spacious, and is trimmed with antique oak.

The staircase, which is of handsome design, starts at the back of the hall, and winds toward the front. It is

lighted by a stained glass window, which sheds a soft and pleasant light over upper and lower halls. Beneath this staircase there is a hat and coat closet, containing a stationary bowl, complete. The fireplace is built of brick, and is furnished with a tiled hearth and colonial mantel. Parlor is treated in a delicate manner with old ivory white and a little gilt. It contains a fireplace, with hearth laid with white onyx tiles, and a mantel of exquisite design. Library is trimmed with cherry and dining room with oak, the latter having a paneled wainscoting and fireplace fitted up similar to one in hall. Hard wood floors throughout. The butler's pantry, good size, contains locker, for china, drawers, cupboards, etc. Kitchen is wainscoted, and trimmed with yellow pine, finished natural. It is provided with sink, range, and two large dressers fitted up in the best possible manner. Four bed rooms, dressing

range of each house is somewhat varied; therefore we present floor plans showing three houses. Halls and parlors are finished in old colonial style, and every bit of woodwork in these apartments is painted white (china gloss), with the exception of the hand-rail to staircase, which is oak. The staircases are unique, and are provided with delicate spindle balusters, oak rail and newels formed of similar balusters. Fireplaces are built of buff brick. The mantels in halls and parlors are of antique design, 5 ft. 6 in. in height, and are ornamented with beaded and fluted work. Dining rooms are trimmed with antique oak, and have open fireplaces, bric-a-brac mantels and paneled wainscoting. Butler's pantries are of sufficient size to be fitted up with the usual fixtures. Libraries are trimmed with mahogany. Floors are of hard wood, laid in narrow widths. The bed rooms and bath rooms on second floor are fitted up in the best possible manner and are painted in delicate colors. The third floor of each house is fitted up and finished similar to second floor. The cellar of each house contains kitchen, laundry, pantry, storage, and servants' bath, all trimmed and wainscoted with hard wood and furnished with all the appointments. The cellar also contains furnace and other apartments. These houses are provided with gas, electric bells, speaking tubes, and all the improvements. Cost of the entire block, \$150,000. Messrs. Fehmer & Page, architects, Boston, Mass.

Our engraving was made direct from a photograph of the building taken specially for the *SCIENTIFIC AMERICAN*.

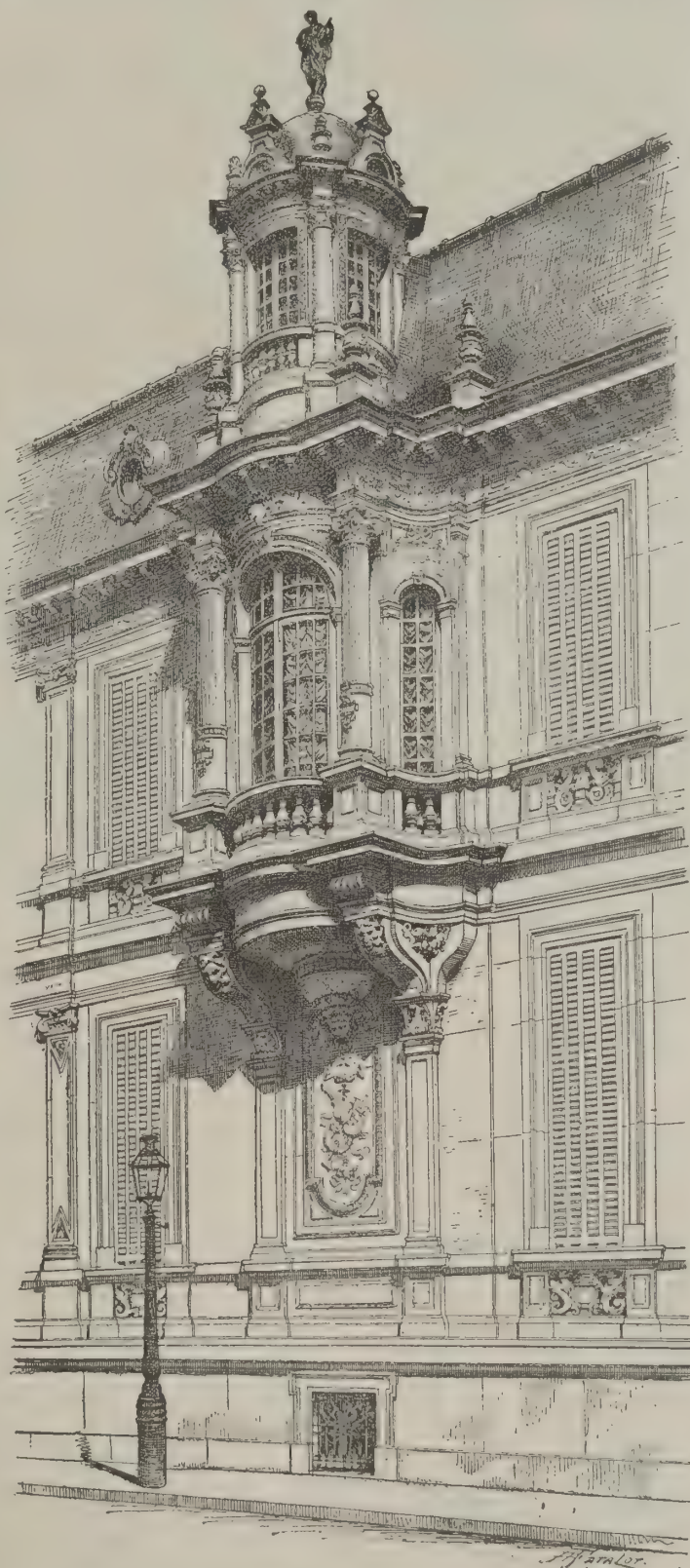
A HOUSE FOR \$7,500.

We give on page 90 a house erected for J. A. Richards, Esq., at Montclair, New Jersey, from plans prepared by Mr. Edward J. Hapgood, architect, New York. The design is a unique model of coziness. The rooms are good sized and well arranged for light and comfort. A shady piazza at front with a return at side. The underpinning is built of rock-faced red sandstone and the building above, of wood, is covered with shingles, stained sienna. The trimmings are painted white and the blinds bronze green. Roof, shingled. Dimensions: Front, 46 ft. 6 in.; side, 58 ft. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Hall, trimmed with white-wood, contains a staircase of unique design. This staircase is provided with stained glass windows that throw a soft and pleasant light over upper and lower halls. The floors throughout are laid with yellow pine in narrow widths. Parlor is treated in a delicate manner with old ivory white, and it contains a paneled divan and an open fireplace, furnished with a tiled hearth and mantel of exquisite design. The remaining apartments are trimmed with white-wood, finished natural, with the exception of library and dining room, which are stained and finished in oak. Library contains a fireplace, with a tiled hearth and mantel. Kitchen, laundry and other apartments are wainscoted and fitted up in the best possible manner, the former having sink, range, dresser and many large pantries. Second floor contains six bed rooms, with large closets and bath room, the latter wainscoted and replete. Two bed rooms and storage on third floor. Cemented cellar contains furnace. Cost, \$7,500 complete.

Our engraving was made direct from a photograph of the building taken specially for the *SCIENTIFIC AMERICAN*.

Non-Porous Walls.

If hollow walls are objected to, there are remedial measures. Thus, Sylvester's process of repelling moisture is an old and simple plan. It consists of using two washes alternately for the surface of the walls, one composed of castile soap and water, and the other of alum and water. The proportions are three pounds of soap to one gallon of water, and half a pound of alum to four gallons of water, both substances to be well dissolved before applying. The first soap wash should be laid on while boiling hot, with a flat brush, and a frothy appearance be produced. After twenty-four hours, when it will become dry and hard, the alum wash to be applied warm, and should also be allowed to dry before a second coat of soap wash is put on. These coats can be repeated till the walls are rendered impervious to water. The combination of soap and water forms an insoluble compound which fills the pores of the brick. The reason why so many houses are uninhabitable through dampness is because the remedy is applied too late, when the bricks have become begrimed with soot. The solution should be applied to newly built walls, and in the manner we have described, thoroughly, not merely a weak solution improperly applied in two coats.—*Building News*.



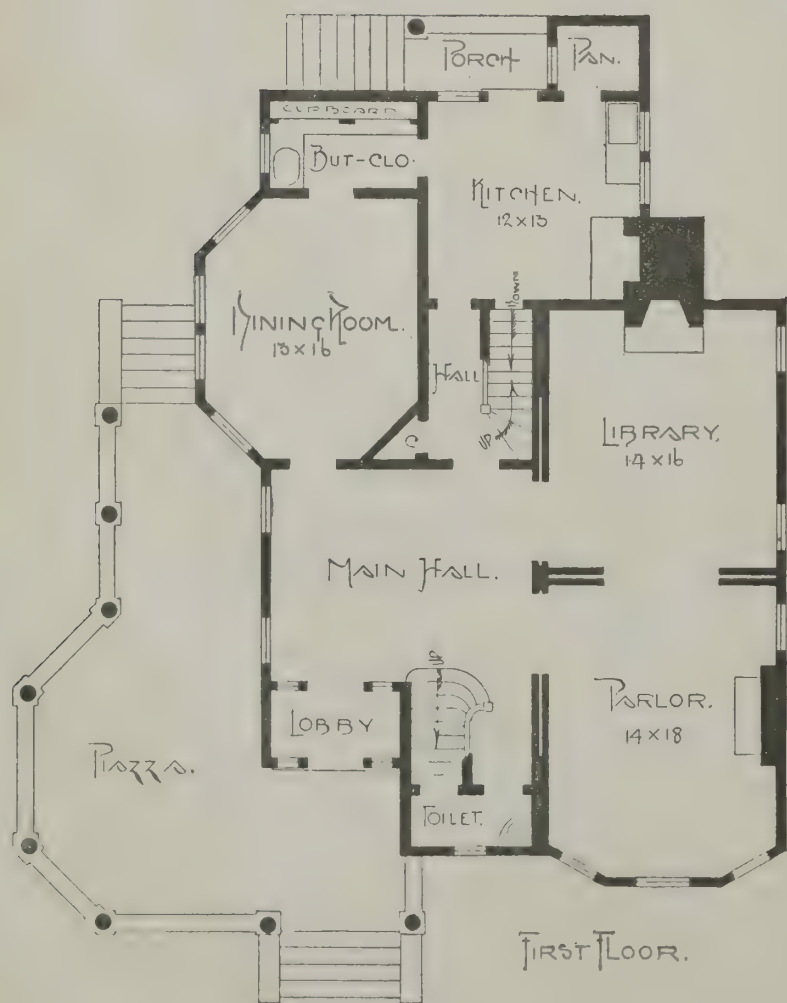
ORIEL OR BAY WINDOW OF A PARISIAN DWELLING.

room and bath room are obtained on second floor, and three bed rooms and trunk room on third floor. Cemented cellar, contains laundry, furnace and other apartments. Cost \$7,000, complete. Mr. Bassett Jones, architect, New York.

Our engraving was made direct from a photograph of the building taken especially for the *SCIENTIFIC AMERICAN*.

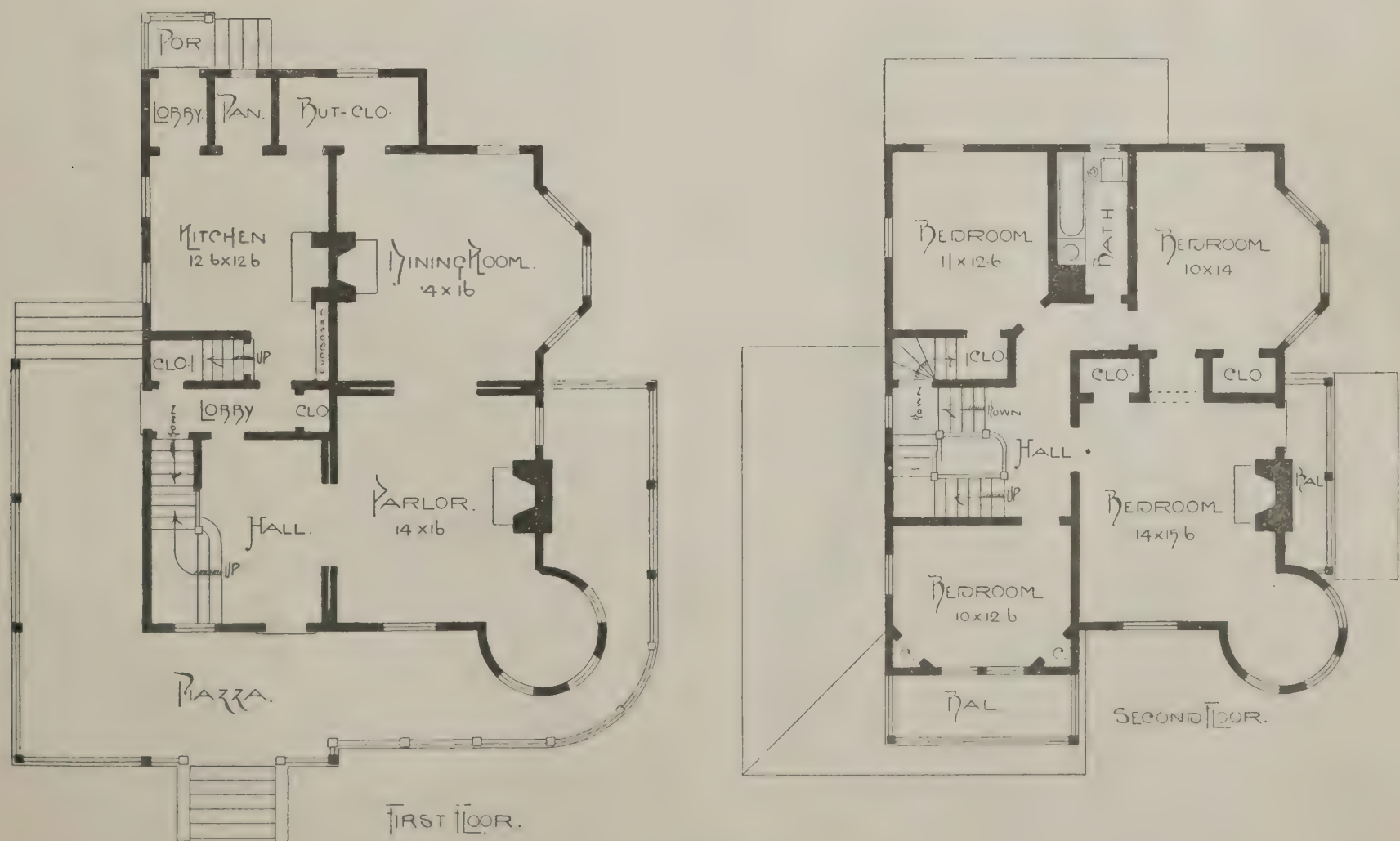
A BLOCK AT BROOKLINE, MASS.

Our engraving, page 89, presents a block of seven dwelling houses, Richter Terrace, erected for Mr. E. R. Knapp, at Brookline, Mass. Dimensions: The extreme width of the entire block is 200 ft. and the depth 60 ft. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 9 ft. The design is very picturesque, owing to its irregular walls, towers, bay windows, balconies, etc. Underpinning is built up with Chestnut Hill stone, laid rock-faced ashlar; the superstructure above is built of Tiffany (old gold) brick. Roof covered with red slates. The interior ar-



[See page 82.]

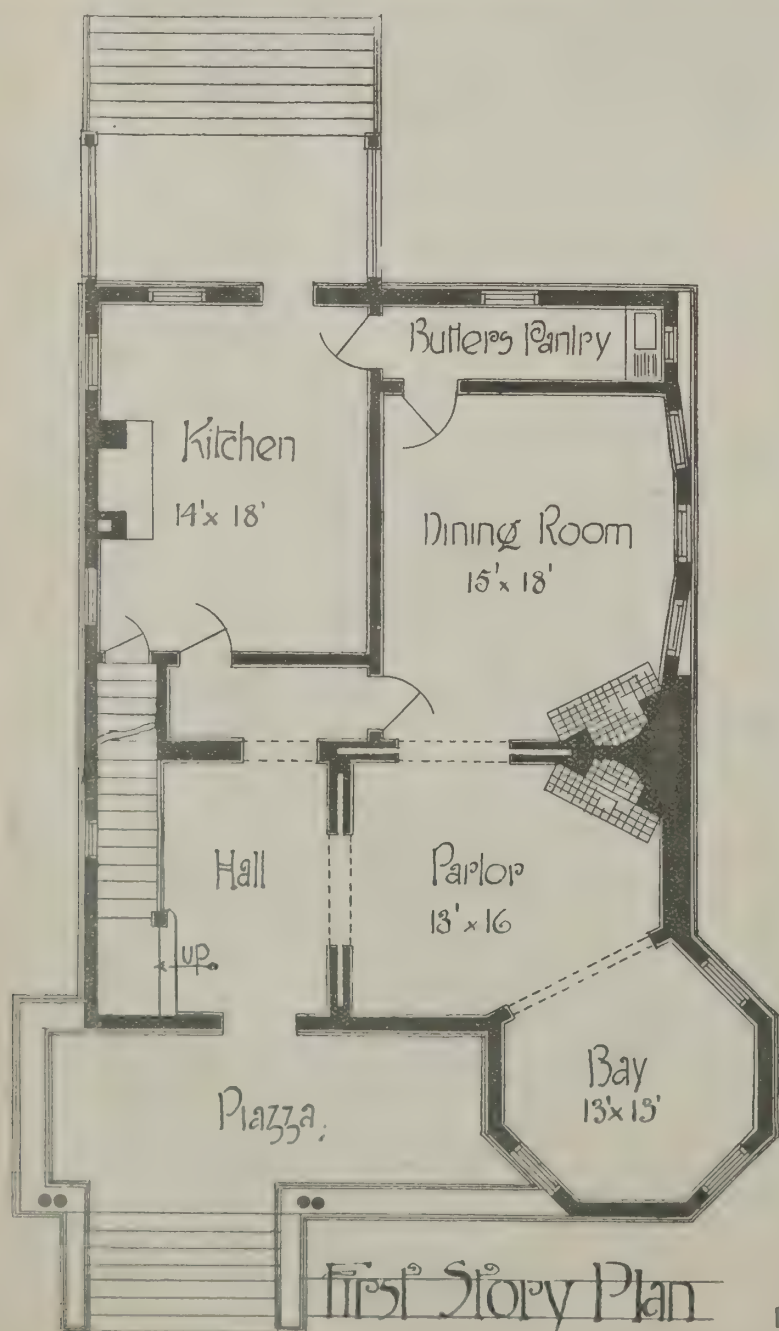
A COLONIAL HOUSE.



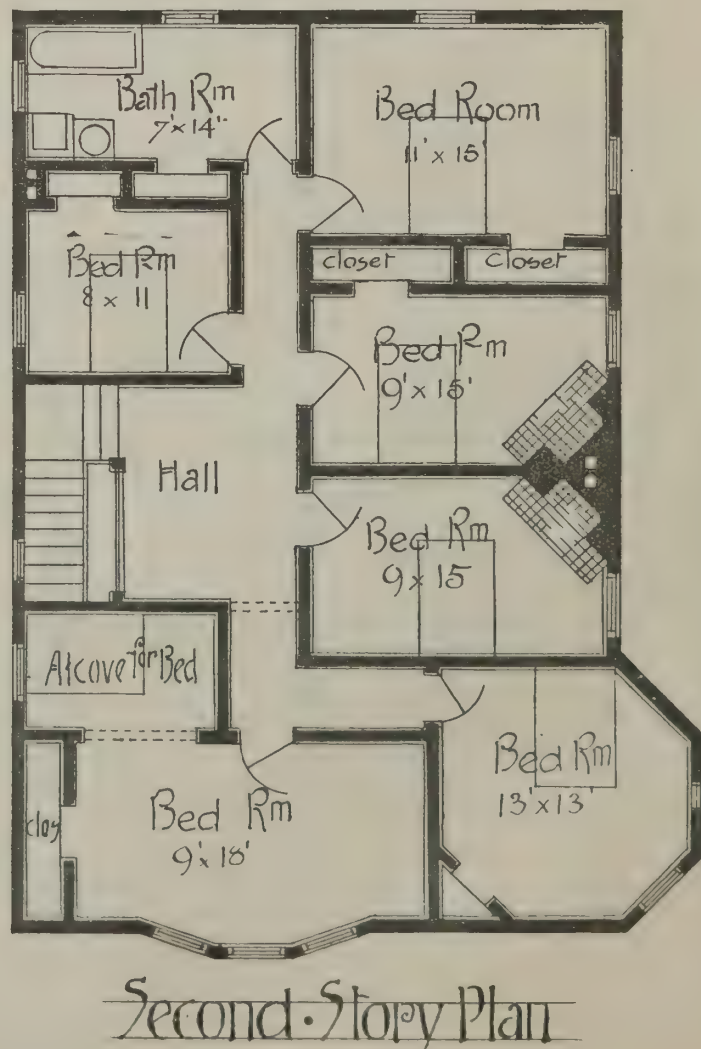
[See page 82.]
A DWELLING AT MONTCLAIR.



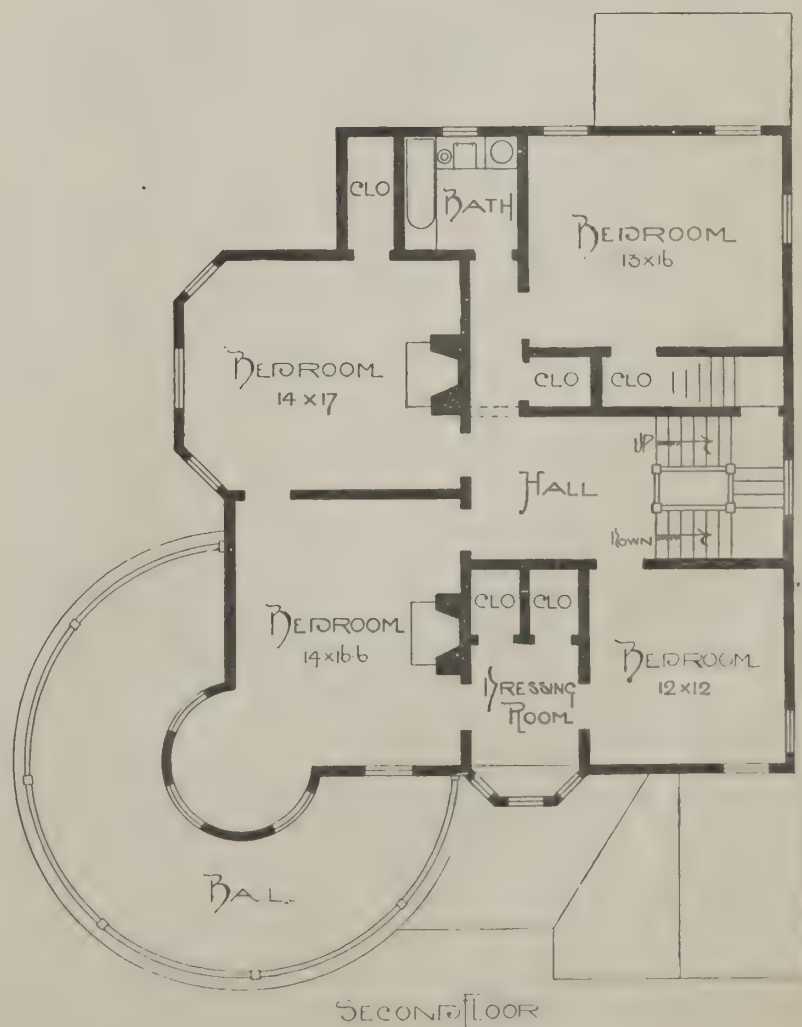
SCIENTIFIC AMERICAN



[See page 83.]



A COTTAGE AT PORTCHESTER.



[See page 83.]

A RESIDENCE AT BENSON-HURST.

SMALL COTTAGE OR LODGE, YORK.

This has been built at one of the outlying entrances to the park at Askham Hall, the seat of Sir Andrew Fairbairn. It is erected in brick, with red tiled roof. Messrs. Chorley & Connon, of Leeds, are the architects. —*Building News.*

The Scientific American a Help to Builders.

When any one begins to think about building a home he is apt to say to himself, "I will have the house built just as cheaply as I can, at the same time make it as attractive in exterior and as comfortable within as possible." The next step is to search for plans, and perhaps some friend directs him to the SCIENTIFIC AMERICAN. Here, to his surprise, he finds spread before him a wonderful variety of photographs of neatly constructed dwellings, with the plans. First he runs over the most economical houses, those for six hundred, twelve hundred or two thousand dollars. He studies the plans carefully, makes himself familiar with the details, the forms and the appearances, which the photographic plates readily enable him to do. The good wife, the daughters and the sons, all do the same, and in the course of their searchings and studies they find their attention almost insensibly directed toward the better class of houses, of which plans and photographs are also given. And on studying these better houses, they are found to be so much more comfortable, roomy, and in every way superior that the notion of a "cheap as possible house" has vanished, and the more sensible conclusion is decided upon that "We will have the very best house our means will permit." Hundreds of architects and builders in all parts of the country can testify to this educative influence of our paper upon their customers. Many builders know by experience that by this means jobs which at first promised only fifteen hundred dollars have been raised to four or five thousand dollars.

It makes a heap of difference to an architect or a builder whether he is employed on a wretched little cheap house or on a good, substantial one. Manifestly then it is to their interest, as well as that of their customers, to have the SCIENTIFIC AMERICAN widely circulated, and its photographic pictures and plans brought everywhere to public notice. Every architect and every builder can do something to aid this good work. Talk about it to friends and customers. Get them to subscribe. It costs only \$2 50 a year. It is the cheapest, finest, and most useful architectural work ever produced. Every number is intrinsically worth more than the price of the year's subscription. Where can a builder find in one number a dozen plans of attractive new houses, with splendid plates in colors, for \$2 50? They are not to be had except in the SCIENTIFIC AMERICAN, and for the money stated, instead of one number, we give a year's subscription. We say specially to architects and builders you were never before supplied with a paper that did you so much good, that tended so much to help you to business and to profitable contracts, as the SCIENTIFIC AMERICAN. We therefore ask you to do all you can for us. Remember, the more subscribers we have, the more we can beautify and improve our publication, and thereby increase your advantages.

AN ASBURY PARK COTTAGE.

We illustrate on page 94 a modern dwelling, erected for Miss Appleby, on Grand Avenue, at Asbury Park, New Jersey. Dimensions: Front, 32 ft. 6 in.; side, 43 ft., not including piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Foundation, stone. Underpinning, brick. First story is clapboarded and painted light olive green, with bottle green trimmings; second story and gables are shingled and painted a tile red. Roof shingled and painted Indian red. The plan presents a pleasant piazza and lookout on the exterior, while the interior contains many large well lighted rooms conveniently arranged. The interior throughout is trimmed with yellow pine finished natural. The hall is provided with a broad staircase, turned out of ash. It is unique in design and is well lighted with windows glazed with stained glass. The fireplaces in hall, parlor and dining room are furnished with tiled hearths and antique oak mantels. Kitchen is wainscoted with narrow beaded stuff and it contains sink, large

pantry, and stairs from cellar to third floor. Second floor contains four bedrooms, with large closets and bathroom, the latter wainscoted and fitted up in the best possible manner. Two bedrooms on third floor, besides ample storage. Cemented cellar under whole of house, contains furnace, laundry and other apartments. Cost \$4,500 complete. Mr. T. A. Roberts, architect, same place. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A QUEEN ANNE COTTAGE.

Our engraving, page 95, presents a cottage, Queen Anne in treatment, erected recently for Mr. H. C. Southwick, at Larchmont Manor, New York. A very rare and tasty bit of rural architecture. A wide piazza at front entrance, extending along the front and side of house. Dimensions: Front 32 ft., side 31 ft., exclusive of piazza and porch. Height of ceilings: Cellar 7 ft.; first story 9 ft., second 8 ft. 6 in., third 8 ft. Cemented cellar under whole of house contains laundry, furnace and other apartments. The underpinning is built of brick and the superstructure above is of wood, with the first and second stories clapboarded, gables shingled, and all painted Indian red with white trimmings. Roof shingled. The interior is quite roomy and comfortable, and it is trimmed throughout with white pine, treated delicately in colors. The staircase is unique, while the fireplaces in parlor and dining room are furnished in a handsome manner with tiled hearths and mantels.



LODGE AT ASKHAM HALL, NE YORK, FOR SIR ANDREW FAIRBAIRN. MESSRS CHORLEY & CONNON ARCHTS

Kitchen is wainscoted and provided with sink, dresser, pantry, range, and lobby large enough to admit ice chest. There are three bed rooms, den, and bath room on second floor and one bed room on third floor, besides ample room for storage. Bath room is wainscoted and fitted up in the best possible manner. Cost \$3,700, complete. Mr. Frank E. Wallis, architect, New York. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

Architects' Difficulties.

There are two classes of the public, those who are ignorant of architecture, and those who know a little. It cannot be doubted that the latter are the most implacable in their demands upon the architect. They want something, they do not know exactly what. In their dealings with the architect they are to a large degree dependent on what they have seen; but as they cannot find the means of conveying their requirements, they are ceaseless in their interference. The really ignorant client relies implicitly on his adviser; he may be troublesome about cost—want to know a great many things as they occur on the building—but he trusts. One of the most common kinds of interference is that of questioning designs. The architect is perhaps coolly told that some other building is perfect, or that Mr. Somebody's architect has arranged this or that very well, and that he, the client, should like it followed. Now this is, to say the least, a gratuitous insult to the adviser, and really is tantamount to telling him that he has yet to learn his business. A man may be forgiven for expressing his satisfaction with a certain building; but a request that his own plans should be altered to make them like something else is really to

call in question the judgment and taste of one's architect. We cannot be surprised if such interference calls for indignant protest on the part of a professional man, for it is equivalent to a patient telling a medical practitioner that some other doctor's prescription is more suitable. Of course, if we consider the question, it is really setting up one's own opinion and acting on one's own judgment, to say that this plan must be altered to agree with something else. The extraordinary thing about the matter is that clients of this kind do not see the absurdity of engaging an architect to prepare plans for them, and afterward ignore them for not doing, as they think, right. Why not employ a draughtsman or a builder to make designs according to some example?—which procedure would be far more reasonable.

How little the employer understands the real function of the architect; how frequently he regards him as a mere copyer or vendor of designs. Such clients think that the design of a building is a sort of mechanical art; that, given certain requirements, the architect has only to apply easy rules to produce a design, or that designs are like tailors' patterns, ready prepared, and only to be selected by the owner. —*Building News.*

Roof Drenchers.

The proprietors of the *Glasgow Herald* have had only too good reason to dread the outbreak of fire, which on three occasions within the last fifteen years has swept round their establishment. These perils have arisen not from any default of our own, but from the misfortunes of others. The greatest conflagration of this nature was that which occurred near the end of 1883 in Messrs. Wylie & Lochhead's premises in Buchanan Street. On that occasion the shooting flames and flakes overleapt and set fire to the roofs of the three buildings between Buchanan and Mitchell Streets which together constitute the offices of the *Herald*. Hissing beyond, the flames communicated with a building in Mitchell Lane, which, like the huge pile belonging to Messrs. Wylie & Lochhead, was burned to the ground. The *Herald* buildings, thus threatened on both sides, and with the roofs actually alight, were saved chiefly through the well directed energy of the employees, who used to good purpose the fire-extinguishing appliances always kept on the premises. In two other instances the establishment almost as narrowly escaped sharing to the full the calamities of its neighbors.

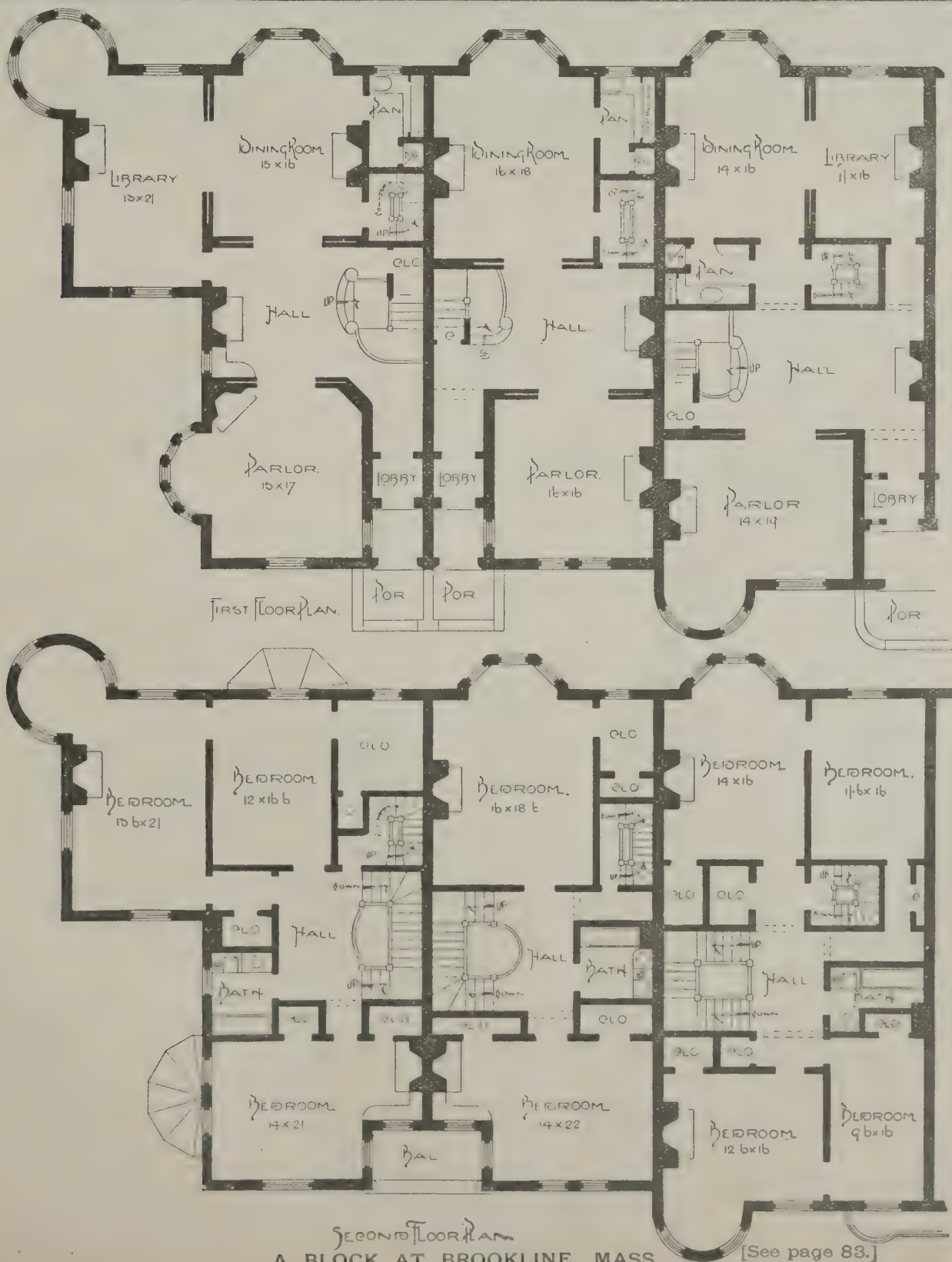
The various departments have been fitted up with the Grinnell automatic sprinklers, consisting of pipes carried

along the ceiling of every apartment, from which plentiful streams of water are at once released at an emergency. Outside the main building, and at a considerable height, a water tower has been erected containing 3,500 gallons, always available; and in the machine room, a little below the level of Mitchell Street, is a tank containing 3,000 gallons of water drawn from the street mains. This tank has the important auxiliary of a Worthington force pump, by means of which the water may be carried to the highest point of the building, or beyond it, at a minute's notice. Mr. Alexander Sinclair, manager, devised a scheme at once simple and effective for drenching the roofs and exposed windows instantaneously and keeping them under flowing water for an indefinite time. By the agency of the force pump, which works automatically, the water is forced to the roofs, along the highest part or rigging of which, and also over all the windows, are carried malleable iron pipes, finished with zinc to prevent rusting and perforated every 3 inches to 18 B. w. g. In a few seconds after the water has been turned on, the roofs and windows are drenched by an unbroken stream, and this, as we have said, may be maintained for any length of time, the 6,500 gallons in store being renewed as the flow proceeds. When the water has been turned off, the pipes are run absolutely dry, to avoid the risk of freezing. The roof drenchers are used periodically, to keep them at all times in perfect working order.

A Correction.

The description of house on page 61, October number, was given on page 39, September number.

The description of house shown on page 38, September, will be found on page 58 of the October number.



A BLOCK AT BROOKLINE, MASS. [See page 83.]



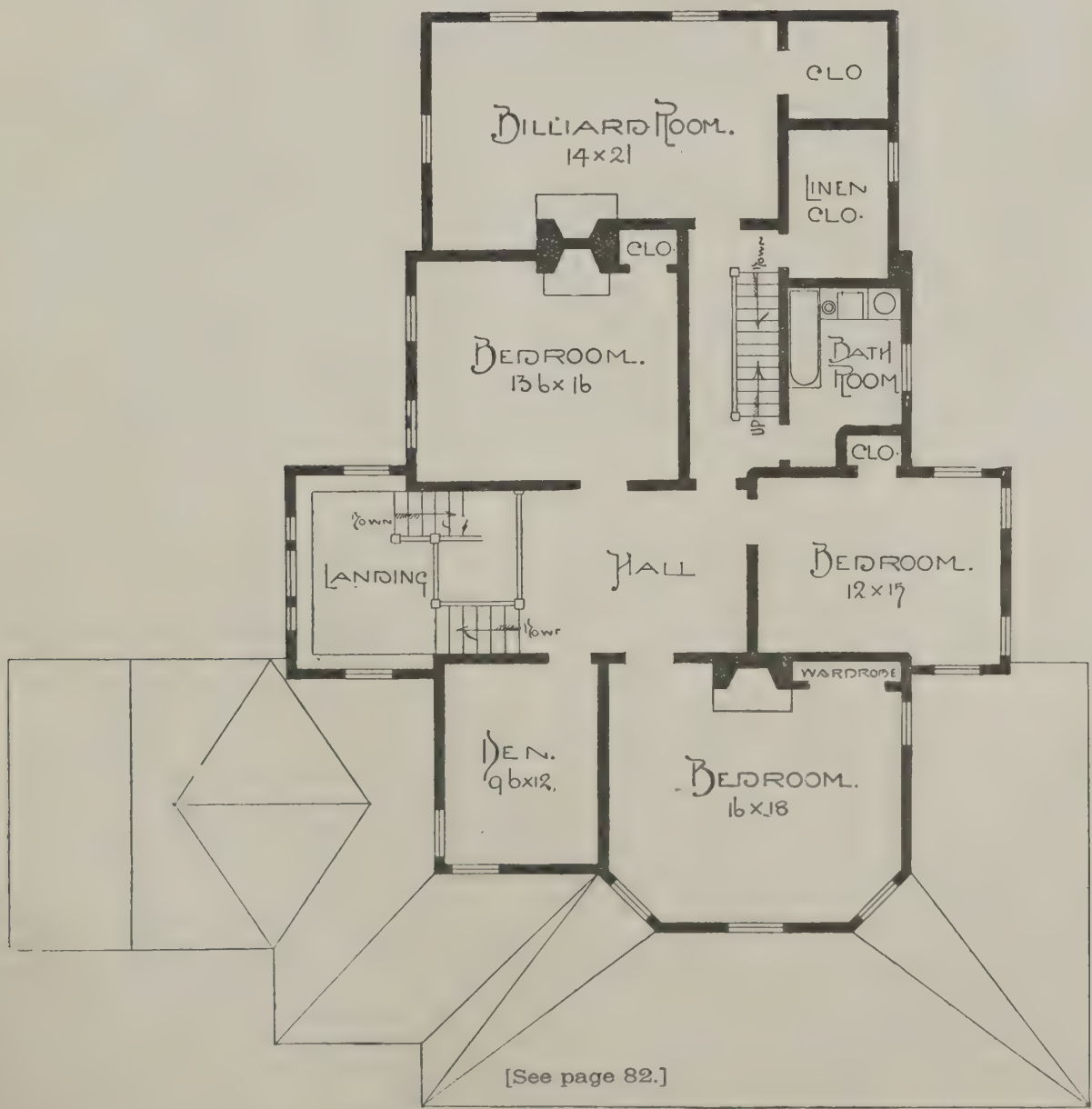
[See page 83.]

A HOUSE FOR \$7500.



A RESIDENCE AT MOUNT VERNON, N.Y.





A RESIDENCE AT MT. VERNON, N. Y.

How to Catch Contracts.

When a customer calls to talk house to an architect or builder, one of the readiest means to inform and interest him is to show the various numbers of the SCIENTIFIC AMERICAN. These are replete with photographic pictures of new and tasteful dwellings and plans. Our customer looks at this one, and that, until he finds a plan that nearly suits his fancy, except that the kitchen is not just as he could wish, or the hallway, or that closet, or "I should like it better if a dormer window were there," or some other minor change were made. To which the builder frankly replies that he understands his wishes to a dot, and will be glad to make up a plan for him; will have it ready to-morrow; and, moreover, "it shan't cost you a penny." This liberal and agreeable treatment is highly appreciated by the customer. After his departure our architect or builder whips out his tracing paper, follows the plan selected, puts in the few changes suggested, perhaps adds a front elevation of the house, all involving but a short time. The customer, on calling, is delighted. The drawings look like new plans specially made for him; is satisfied this architect or builder is the man for him. His mind is at once made up, and the bargain soon settled and closed. Such, in

houses. We know of towns where every builder is a subscriber, and all are full of business. People who see illustrations of handsome buildings are greatly influenced thereby. A notable improvement in architecture takes place in all towns and villages where the SCIENTIFIC AMERICAN freely circulates. Improved architecture increases the value of property. This is a self-evident proposition. Therefore, do all you can to boom this important and most useful periodical. This number closes the year. The next number begins a new year. Now is the time to renew your own subscription and to add another for your friend. Can you think of a better holiday present for him?

A TRIUMPHAL ARCH AT TIMEGAD, ALGERIA.

BY ALEX. GRAHAM, F.S.A.

There are few spots in Algeria which possess a greater interest to the architect than the site of the Roman city of Thamugas, better known by its modern name of Timegad. Of its history, like other cities and towns in this great Roman colony, we have but little knowledge, except what can be gathered from the numerous inscribed stones that lie scattered in every direction over a large area of ground. In the Itinerary of Antonine it is called Tamugada, and Ptolemy, the

The most important of the monumental remains is a triumphal arch occupying a prominent position on the northwest side of the town, and visible from the plain below at a distance of several miles. Its present ruined condition is apparently due to an earthquake, evidenced by the position of some of the blocks in the upper part of the structure. The attic, with the dedicatory inscription, has been overthrown, but several fragments restored by M. Leon Renier leave no room for doubt that the arch was dedicated to Trajan by the third Augustan legion, whose headquarters were at Lambæsis, some twelve miles distant from Thamugas in a westerly direction. The mass of the structure is of sandstone, but the columns and all the decorative features are entirely of white marble, and there are indications of the attic having been faced with slabs of the same material. The drawing, which is here reproduced was made on the southwest side, to avoid the glare of the sun when sitting in an opposite direction; but, by comparing it with a sketch by Bruce in 1765,* it will be seen that the eastern side is in far better preservation and the main features of the composition are more easily studied. The podium of the monument is almost buried in sand, but a few apertures between the fallen masses reveal not only the base of the structure, but



TRIUMPHAL ARCH, TIMEGAD, ALGERIA.—FROM A DRAWING BY MR. ALEXANDER GRAHAM, F.S.A.

brief, is the way it works, and we have not related any fairy story. It is the short narrative of hundreds of actual instances. We say to architects and builders everywhere, your interests are sure to be promoted if you keep on hand and make yourselves familiar with the numbers of the SCIENTIFIC AMERICAN, so that you can readily display them to your customers, and point them to examples such as they require. There is no other work like it, none that has so wide a circulation among builders, none that does them so much practical and financial benefit. It assists to educate customers up to the point of having good houses and it does this quickly, for it employs the most effective of all means for rapid education, namely, the *attractive and truthful picture*. Nearly all the illustrations given are photographic plates made from the buildings, showing all the minute details. These plates are specially prepared for the SCIENTIFIC AMERICAN. Every number presents a new and fresh supply. They are not fancy sketches, but genuine photo. plates of the objects they purport to illustrate. You cannot do a better thing for yourself than to subscribe for this paper. You cannot do a better thing for your fellow architects and builders and for your neighbors than to urge them to subscribe.

The circulation of the SCIENTIFIC AMERICAN stimulates and promotes the building of new and improved

geographer, speaks of it as Thamutuda. In later times it is mentioned as Thamugas, and as it became in the fourth century the seat of a religious agitation, the names of several bishops of Thamugas frequently appear in early Christian writings. When Solomon, the Byzantine general, arrived at the gates in 535 he found the city in ruins. So we may assume that, with the fall of the Roman empire, Thamugas shared the fate of other towns in North Africa, and became a prey to the horde of vandals who swept across the country early in the fifth century, carrying nothing but fire and destruction, and leaving behind them blackened masses of stone and brick. The ruins cover a large surface of undulating ground, forming the lower northern slopes of the Aures range, and, owing to the excellence of the building materials, and the use of a good deal of hard blue limestone as well as of marble, decay is little noticeable in many of the overthrown blocks and votive monuments. The forum, which was partly unearthed a few years ago, still retains its original paving, and the bases of the shafts forming the internal and external colonnades are many of them undisturbed. The theater, now buried in 16 feet of earth, the walls of the Basilica, the overthrown temple of the time of Valens, dedicated to Jupiter Capitolinus, and of gigantic proportions, are sufficient to give an idea of the rich field for research still awaiting the spade of the explorer.

parts of the original paved roadway. The arch itself, as shown in the restoration here given, had the usual features common to similar memorials that recorded the beneficence of an emperor or marked the victories of a great people. Exception may be taken to the broken pediments as a debased feature in classic composition, but it must be admitted that picturesqueness is gained by the use of this doubtful expedient. The subsidiary columns, resting on corbels, which flank the two side recesses, are unusual, and are certainly pleasing to the eye. This arrangement imparts a richness to the monument, which in other respects is devoid of ornamentation. It should be mentioned that the volutes of two of the capitals of the principal order are in the form of eagles. The colonnade in the distance, shown on the drawing, is that of the forum already referred to. Portions of the wall, forming the fronts of a series of shops, are still standing. The bases of the shafts are undisturbed, as well as of the piers and columns of the central gateway.

Thamugas of the Romans must have been a pleasant city to dwell in. The configuration of the surrounding country had many charms. The hills, now rugged and bare, were then clothed with timber. The great plain that stretched far and wide in front of the city, now treeless and unpeopled, was then a garden of produce.

* "Travels in the Footsteps of Bruce in Algeria and Tunis," By Sir R. Lambert Playfair, C. Kegan Paul & Co., London, 1877.

tiveness and dotted with the farmsteads and villas of successful colonists. The surface of the soil, now scratched here and there with rude implements of husbandry, was then tilled and irrigated, and, owing to its wondrous fertility, helped to fill the granaries and storehouses of Rome. It is piteous to observe so fair a land converted into a desert, and to mark the lamentable results of long centuries of ignorance, neglect, and misrule.

"Strange—that where Nature loved to trace,
As if for gods, a dwelling-place,
There man, enamour'd of distress,
Should mar it into wilderness."

—The Builder.

Cypress Timber and its Uses.

Owing to its beautiful finish, its durability and lightness, cypress timber has long been in favor in the Gulf coast States of the South, is fast growing in favor in the more Northern States, especially among those who have tested and know its many good qualities, and is beginning to supply the place of white pine to Northern builders. Cypress is specially adapted to building tanks, tubs and vats, and when used for such purposes it will never decay. It also makes better

attains an enormous size. The trunk is straight and without limbs often to a height of seventy-five feet or more, and large trees measure 120 ft. in height, and twenty-five feet and over in circumference about the conical base, which at the ground is often three or four times the diameter of the trunk. Authorities disagree as to the varieties, some claiming that there are three kinds—red, white or yellow, and black—while others claim that they take their names from the color of their heart wood, which varies according to soil and conditions. The white or yellow variety grows largely in Arkansas, while the red and black varieties are found in Louisiana and other Gulf States.

The method of getting cypress out is as follows: The swamper, who are a hardy set, generally go in the swamps in August to "deadend" and "trail." The former term signifies the undercutting, or cutting the tree half down, and then "girdling" it. The latter is to cut the "knees" or cypress spurs and undergrowth close to the ground, making a trail or road for each tree out into the main roads. All this is done in the fall. When the water rises in the spring the trees are cut down, sawn off and floated out to the bayous or lakes, where they are rafted ready for the towboat or

There are eleven mills in Mobile engaged in the manufacture of cypress shingles, the cut of the past twelve months, ending October 1, being 200,000,000. —*Southern Architect.*

Improve Your Property.

Whoever owns a town lot is apt to be looking forward to the time when he will erect upon it a dwelling, and at first blush he thinks he will be satisfied with a house of extremely moderate cost. This might be the correct thing to do if only his present monetary affairs were to govern, but there are other considerations which should not be overlooked. Perhaps the property is your chief possession, and you may have reason while you live to wish its value were increased. You may need to rent or sell it; or your children who come after you may be obliged to do so. Which do you think will most increase the value of the property—a poorly built, cheap house, or a substantial, attractive and comfortable one? Which will sell the easiest? Which will rent for the most? Which tend to raise the value of property in a community—good and tasteful dwellings or flimsy and common-looking concerns? We say to every lot owner, when you set about the im-



RESTORATION OF TRIUMPHAL ARCH, TIMEGAD, ALGERIA.—FROM A DRAWING BY MR. ALEXANDER GRAHAM, F.S.A.

sash, doors, blinds and frames than white pine. A great many railroads use it for water tanks, and it is also used for ties and bridge timbers. It is used all over the lower South for shingles, and in every instance where a fine finishing lumber is desired. It stands the weather better than white pine, does not warp or twist, and does not shrink or swell after being once thoroughly seasoned. Exposed to the weather, it will last twice as long as white pine, and makes better shingles, tank stuff, fence posts, etc.

Very few Northern people understand the nature of cypress. It is easiest described as a water cedar, growing in swamps. It has the durable qualities of red cedar, combined with lightness and softness of white pine, but it has a great advantage over white pine, in that its lasting quality is three times as great. No lumber in the world equals it for siding or weather boards, exposed floors or shingles. Siding can be used and not painted, and it will last fifty years. If painted, the paint will not crack or peel off, nor will the sap of the wood show through the paint, as in the case of yellow pine. The durability of the cypress shingle is illustrated by the examples of roofs here and in New Orleans, in good order, laid sixty years ago.

Cypress timber grows very tall, straight and thick, in isolated patches or groups called "brakes," in the shallow swamps, lakes and bayous, usually in from one to five feet of water, and, under favorable conditions,

to be floated to the mills by raftsmen. Ten trees usually make a "crib." They are fastened together with "binders" laid across them, holes are bored through them into logs, and a two inch pin, fourteen inches long, driven in. On the rivers tributary to Mobile, it requires a very high stage of water to reach the best cypress, and nearly all the cypress that reaches this market is rafted down the rivers. When the rafts of cypress have been gotten out of the creeks and bayous into the main streams, they are secured to await a fall in the rivers, as the rafting to market cannot be safely done at a very high stage of water, the current then being so strong as to endanger the breaking up and consequent loss of the logs.

"Brakes" of white cypress are to be found in Arkansas containing from twenty-five to one hundred million feet, but this variety of cypress is said to be limited, and there are probably not more than 2,000,000,000 or 2,500,000,000 feet in that State. The timber will average about 6,000 feet to the acre.

One peculiarity about cypress is the uncertainty of the supply. The history of cypress freshets has been examined into, and it has been ascertained that they come about every ten years. There is high water every year, and some cypress is gotten out annually, but the floods, which go back all over the swamp lands and stay there long enough to permit of a fine cut of timber, do not come oftener than once a decade

provement of your property, do your level best to put up a good building, for when completed it is there to stay and will give you satisfaction. A first class house is almost like a deposit of gold in a sound bank. You can always sell it or rent it at the highest market price. Everybody wants to live in a good house; nobody desires a poor one.

PATENTS.

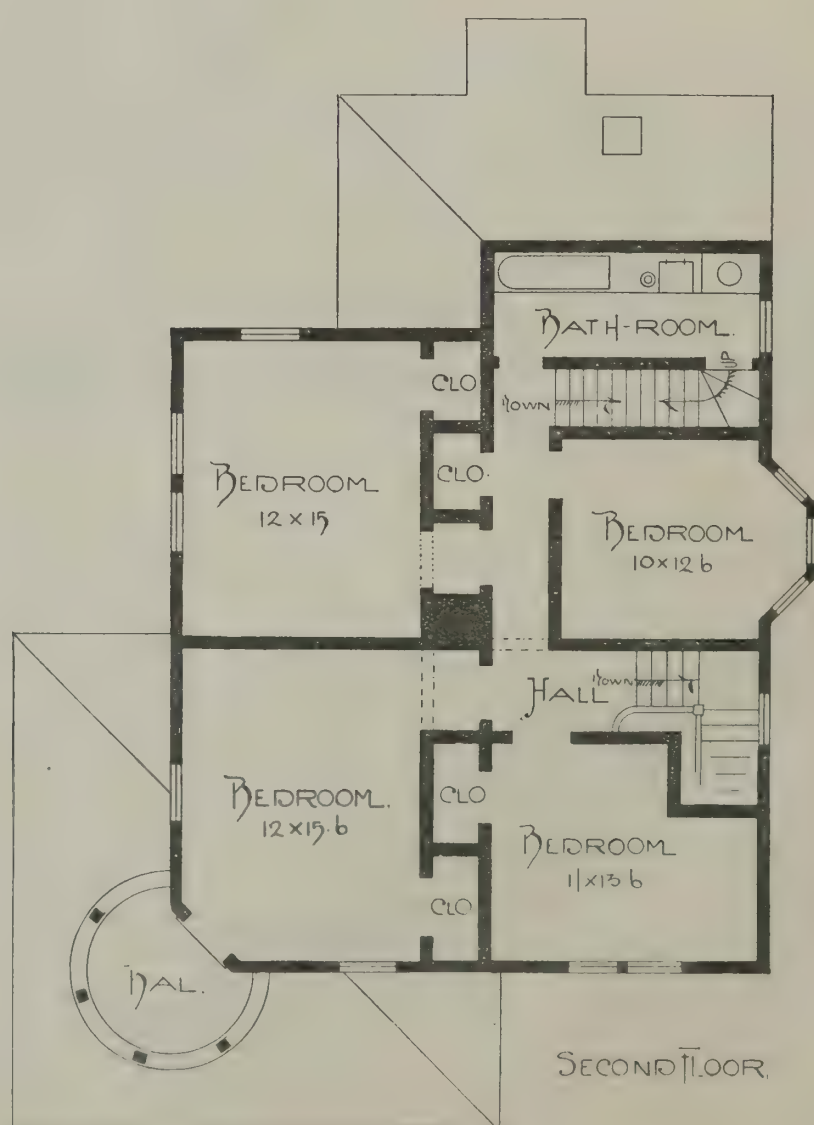
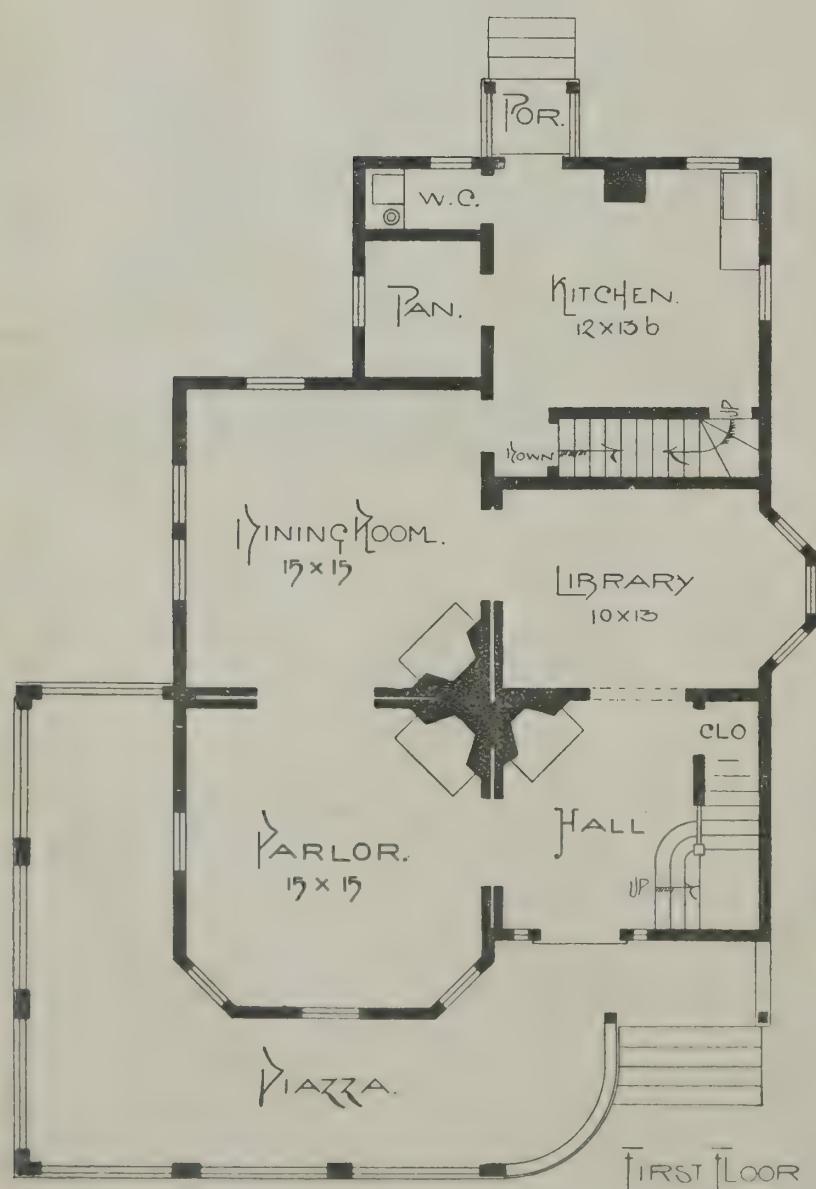
Messrs. Munn & Co., in connection with the publication of the *Scientific American*, continue to examine improvements and to act as Solicitors of Patents for Inventors.

In this line of business they have had forty-five years' experience, and now have unequalled facilities for the preparation of Patent Drawings, Specifications, and the prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business entrusted to them is done with special care and promptness, on very reasonable terms.

A pamphlet sent free of charge, on application, containing full information about Patents and how to procure them: directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

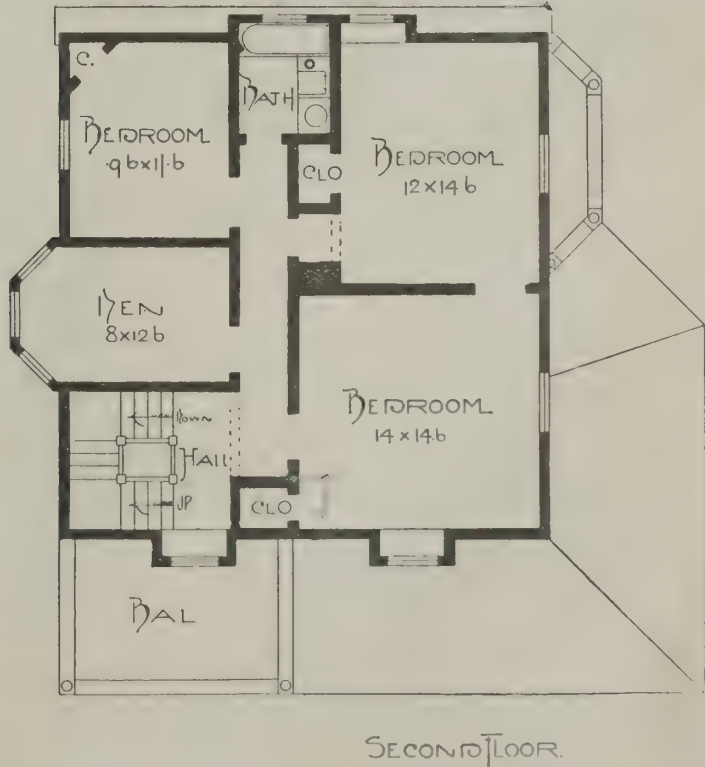
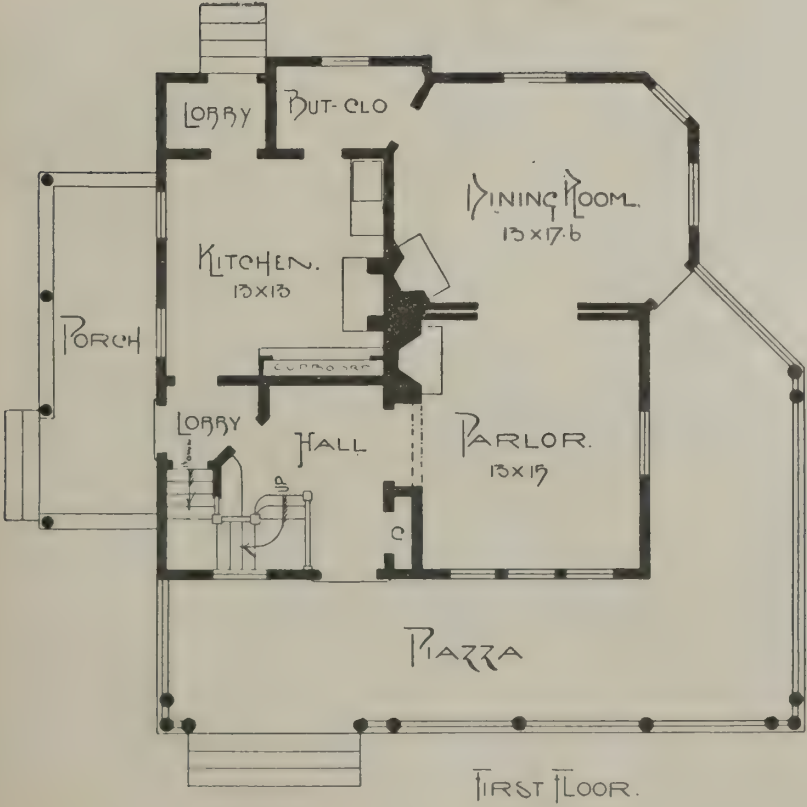
We also send, free of charge, a synopsis of Foreign Patent Laws, showing the cost and method of securing patents in all the principal countries of the world.

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[See page 88.]

AN ASBURY PARK COTTAGE.



[See page 88.]
A QUEEN ANNE COTTAGE.

CHURCH AND SUNDAY SCHOOL ROOMS.

Our engraving below shows the new Wesleyan chapel, Sunday school, and lecture rooms, at West Kirby, England. The general appearance is very fine; but the buildings are not expensive. John Wills, architect. For our illustration we are indebted to *The Builder*.

Some of the Merits.

The present number of our journal completes the year, when an excellent opportunity will be afforded for the entry upon our books of new subscriptions.

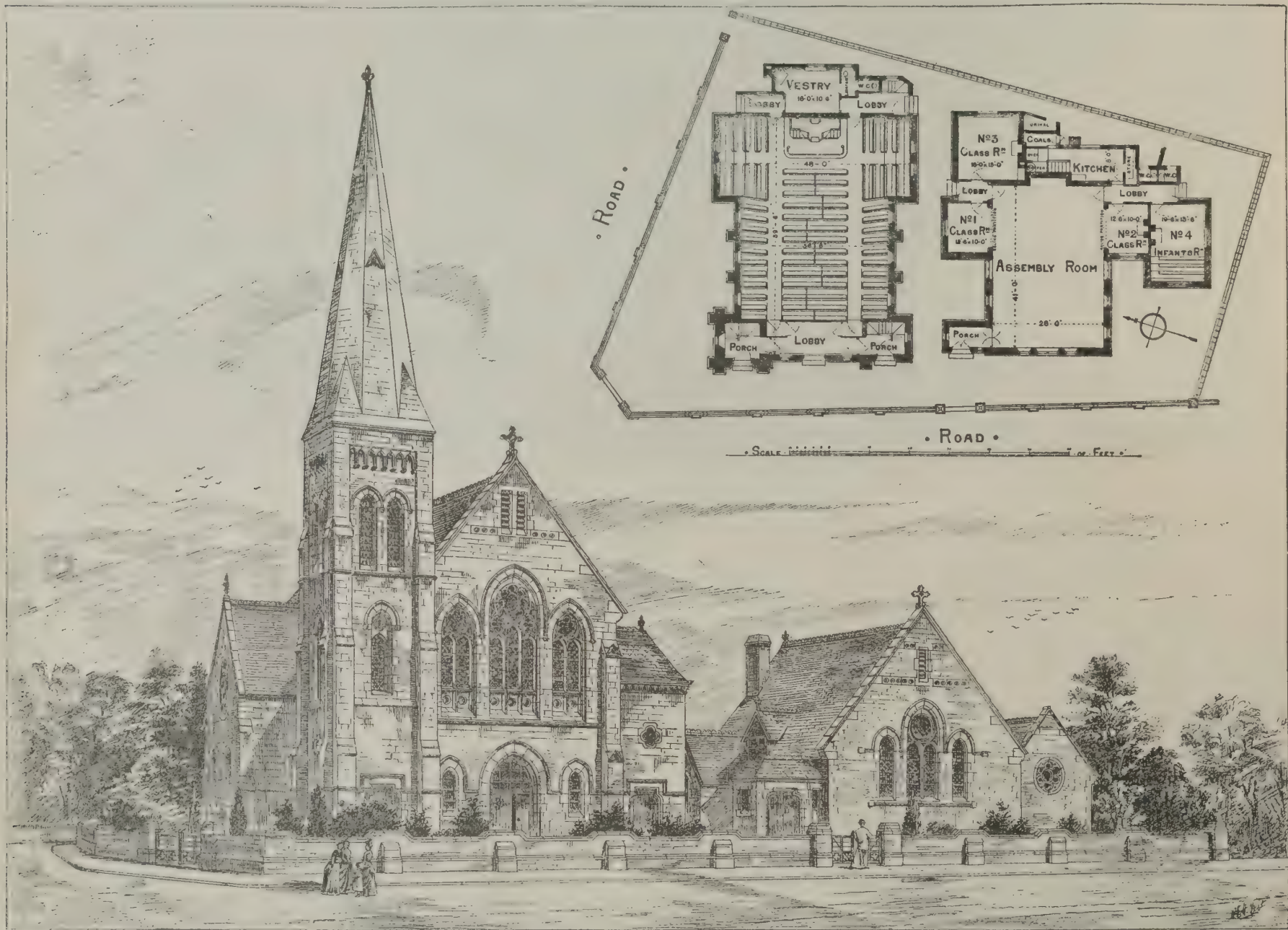
One of the distinctive features of our publication is the presentation in every number, both in colors and in half-tone prints, of new and fresh collections of photographic views showing recently built dwellings, and other structures, with the floor plans. In this way we place before the reader a great variety of the very latest and most approved forms of construction, not from one locality only, but selected from every part of this great country. Wherever good taste prevails in the display of architecture, especially in the branch

When the design of the building is selected and the work of construction begun, the next subject for consideration is the plumbing, the warming, the lighting, the hardwiring, the glazing, the adorning, the painting, the finishing, and finally the furnishing and household fittings of the building. In all of these matters the pages of the *SCIENTIFIC AMERICAN* teem with the most valuable information. Here may be found the illustrated announcements of the most reliable manufacturers of every class of materials, goods, and appliances required in buildings. In this department of the paper upward of two hundred engravings are given in every number. The value as a convenience to the reader in having constantly at hand an illustrated, comprehensive directory of the latest productions cannot be overestimated.

Boschin.

According to the *Wochenschrift des oesterr. Ingenieur Vereins*, a preparation is now used which can be laid over cement and is elastic enough to stretch without showing cracks. This preparation was invented

being laid on trestles of a proper height to rest the auger upon while boring, the men set up a lathe to turn the least end of the poles to fit them to the cavities of the great end of the others. The lathe being set up and the poles cut to the lengths they would conveniently hold, 8, 10, or 12 ft., they turned the small ends of the poles (about 5 or 6 in. in length) to the size they intended to bore the larger ends (about the same depths, viz., 5 or 6 in.). It was generally intended to make a joint to shut each pair of poles together; the concave part being the female part, and the other part the male of the joint. In turning of the male part they turned a channel in it, or a small groove at a certain distance from the end; and in the female part they bored a small hole to fit over this channel. This being done, they bored the holes through, and, to prevent them from boring out at the sides, they stuck great nails at each end, to be a guide to them in boring straight through, though they usually bored them at both ends, by which means, if a pole were crooked one way, they could bore it through and not spoil it. The holes being bored, they formed them into pipes in the



PLG171 LITHO. SYRACUS & CO. 22, MARTIN LANE, CANNON ST. LONDON, E.C.

CHURCH AND SUNDAY SCHOOL ROOMS.

pertaining to homes and dwelling houses, there the artists of the *SCIENTIFIC AMERICAN*, with their cameras, do sooner or later make their appearance.

The usefulness and influence of our periodical is now widely and permanently established. Many of those who contemplate the erection of buildings now consult its pages for good plans and elevations, which are here given in numerical profusion.

The practical builder finds the *SCIENTIFIC AMERICAN* to be almost a necessity for himself and for his customers. With the plans and photographic elevations which we give, the builder is enabled easily to modify or to duplicate any of the structures we illustrate.

The photographs show the exact form, position, and details of the principal parts, and the builder is never at a loss how to proceed. Of these facts we have the most abundant and convincing testimonies. Many thousands of new buildings have been and are constantly being erected in all sections of the country from the plans given in the *SCIENTIFIC AMERICAN*, and as a result there is to be seen on every hand a marked and growing improvement in architectural styles. Builders now aim to select, even for the cheapest houses, the most tasteful designs, and of these the *SCIENTIFIC AMERICAN* regularly furnishes to them an abundant and satisfactory supply.

by Herr Johann Bosch, who has called it "boschin." Its principal ingredients are said to be asphalt, india rubber and mineral tar, and it costs about two and a half florins per square meter, or about ninety-five cents per square yard.

Water Pipes of Alder.

Formerly the large alder was much esteemed for such parts of work as lie continually under water, where it sometimes became as hard as stone, but if suffered to lie exposed to the weather, and at other times under the ground in watery places, it decayed in a short time. Vitruvius informs us that the morasses about Ravenna, in Italy, were piled with alder timber, in order to build upon, for which use he highly commends it. The Rialto, at Venice, is said to have been built upon piles of this wood. Trunks of trees or poles of alder were at one time much used in England for water pipes for the conveyance of water through bogs and dams, and also for water pipes for conveying water to supply houses from any spring.

Large poles of trees of this wood were also used for ground cuts. The poles were about 8 or 10 in. in diameter, and the cavity in them about 4 or 4½ in. But for water pipes, poles about 4 or 5 in. diameter were sufficient, with the cavity about 1¼ in. or 1½ in. The method of boring alder pipes was as follows: The poles

ground, for which purpose they dug a trench, and prepared it with clay to ram in the concave part, which was first bound with an iron ring round it to prevent it splitting. Afterward they drove in the convex part till the groove in it was just under the hole, and poured melted pitch, hot, into the hole in the female part. By this means the junctures were rendered very compact and close, and they proceeded until they laid all their poles or pipes in their order.—*The Architect*.

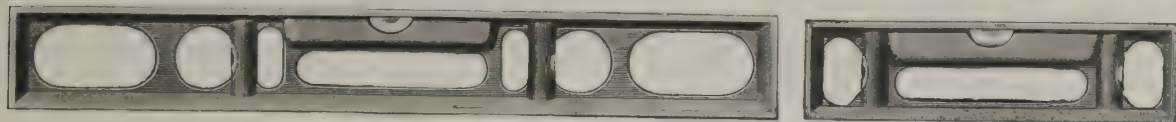
THE following plan is adopted in the Paris Laboratory for testing the comparative durability of paving stones. A sample of the rock is placed upon a horizontal plate rotating round a vertical axis and pressed against it by suitable contrivances. The wear is then compared with that of a standard material under the same conditions.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.

IRON LEVELS WITH DOUBLE PLUMB.

We show two sizes of a new level manufactured by C. F. Richardson, of Athol, Mass. These levels are adapted for carpenters' and machinists' use. The smaller cut is of the 6 in. level, and the other the 12 in. level. The vials are not adjustable, but are firmly and accurately set, and will not get out of place when the



IRON LEVELS WITH DOUBLE PLUMB.

level is dropped. They are moderate in price, and well made

KENTUCKY NATIONAL BANK BUILDING.

The accompanying half-tone reproduction clearly shows this handsome structure, which is widely known as being one of the most elegant bank buildings in the South. It is one of the finest creations of the well known architects, Messrs. McDonald Bros., and the engraving is made direct from a photograph of the building. In this building the Buffalo "Hot Blast" or "Plenum" system of heating and ventilation was adopted as being the best for the purpose. The outfit consists of a fan 110 in. in diameter, with a horizontal engine connected directly to its shaft, and a 3,200 ft. capacity heater located in the basement. The fan receives its intake of fresh air through an ingenious arrangement of a jet or spray of water, so that all dust and smoke is thus prevented from being distributed by the fan to the different parts of the building, when it is run solely for ventilating purposes. The Buffalo Forge Co.,

The Largest Plank in the World.

The N. W. Lumberman gives an engraving from a photograph of a redwood plank that is 16 feet 5 inches wide, 12 feet 9 inches long, and 5 inches thick, and is about 90 per cent clear. It was taken from a tree 35 feet in diameter and 300 feet high. According to its rings it was more than 1,500 years old. The tree was

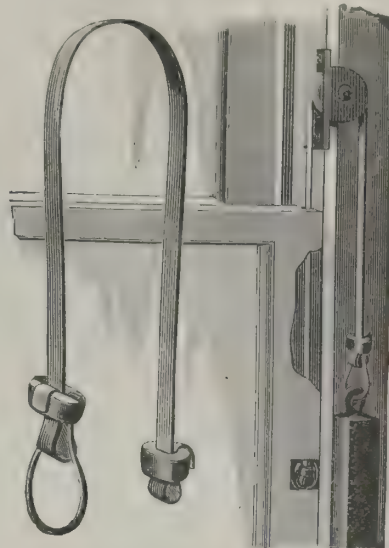
cut 28 feet from the ground, and the plank was hewed out of the stump, representing a section taken from near the heart to the bark. After it was displaced it was lowered by block and tackle, with a locomotive for power. In the way of labor its cost represents the time of two men for a month, simply to prepare it in the rough for shipment. To this the cost of transportation must be added, making a total of about \$3,000. It was moved by water to San Francisco.

After being on exhibition some time, a car was specially prepared to transport it to Chicago. This was done by cutting a slot in the center of a flat car, in which stirrups were pendent. The plank was placed on edge in the slot, its lower edge being within about a foot of the ties.

The plank was cut on the lands of the Elk River Mill and Lumber Company, in Humboldt County, Cal., is the property of J. L. Harpster, of Eureka, and B. F. Noyes, of San Francisco, and is on exhibition in Detroit, Mich., whence it may be sent to East Saginaw and elsewhere, to finally bring up in Chicago at the

A STEEL RIBBON FOR HANGING WINDOW OR HEAVY DOORS.

The illustration represents the sash ribbon, with pulleys and attachments, for hanging windows or heavy doors, of the Gardner Sash Balance Co., of Chicago. The steel ribbon is made specially for this purpose, and its tensile strength is said to be 100,000



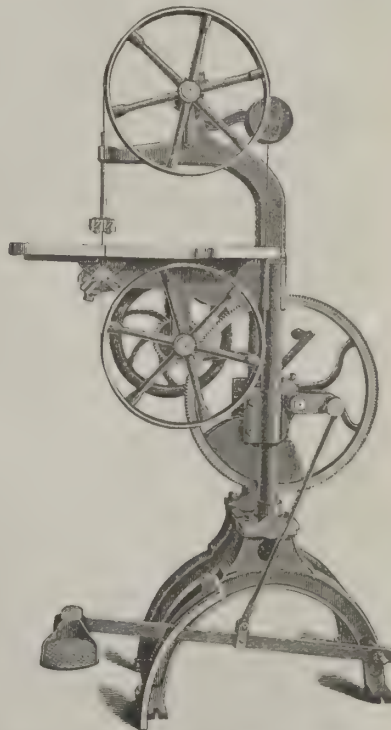
THE GARDNER SASH RIBBON.

pounds to the square inch. It is prepared to prevent corrosion, and can be painted to match the color of the woodwork. A special pulley is made for use with this ribbon, which is not sold except with the pulley, and with it any door or window, no matter what its weight, may be hung in the most satisfactory manner. The pulleys have turned axles, turned wheels, and steel pins, and the grooves are such as to allow the ribbon to run noiselessly. They are made in different styles of finish to match the leading styles of hardware now furnished.

MARSTON'S HAND AND FOOT POWER MACHINERY.

We present herewith a cut of the Marston Hand and Foot Power Band Saw.

This machine is designed for actual work, and is strong, well made and accurate. It is made to run by foot power, and additional power can be applied by using the crank that is furnished with each machine. It will do all kinds of outside sawing, and cuts much faster than the jig saw. It has a capacity of six inches under the top guide, and will swing fifteen inches between saw and frame. The table is three feet six inches from the floor, with surface of 18 x 21 inches, and is arranged for cutting on a bevel. There is also a stationary table, which is six inches wide by twenty-four inches long. Guides for the saw blade are placed both above and below the table. The driving power is by means of automatic machine-cut gears from solid



HAND AND FOOT POWER BAND SAW.

iron. The shafts are made of Bessemer steel, lathe-turned. The upper saw shaft has an adjustment to bring the upper band wheel into line with the lower band wheel. Saw pulleys are covered with endless rubber bands cemented to the iron wheel.

This firm also manufactures a band saw arranged to run by power, of the same size and general design as machine shown in cut, having pulleys on lower band wheel shaft, and countershaft on lower part of frame, from which a belt can be carried to main shafting. For catalogue giving full description and prices address J. M. Marston & Co., 199 Ruggles St., Boston, Mass.



THE KENTUCKY NATIONAL BANK BUILDING, LOUISVILLE, KY.

Buffalo, N. Y., manufacturers of this system of heating and ventilation, will be pleased to furnish further data or information on application.

THE new fall builders' catalogue of E. T. Barnum, manufacturer of Art Wire and Iron Work, of Detroit, Mich., has been received. The catalogue comprises illustrations of roof crestings, balcony railings, stairways, stable fixtures of all kinds, window guards, sidewalk gratings, jail cell work, iron beds and a very large line of builders' iron work. The new catalogue is sent free to all who apply.

world's fair. The plank shows coarseness of growth, with richness of figure, and a finish such as the highest quality of material and the best efforts of Berry Brothers, the varnish manufacturers, of Detroit, can secure.

WITH the Norton Door Check, no door can slam, no door can fail to close tight, this simple attachment forming the best insurance ever provided against draughts. It is sold by hardware dealers, and by the Norton Door Check and Spring Co., Boston, Mass.

THE FULLER & WARREN CO. HEATERS.

The Fuller & Warren Company, of Troy, N. Y., have introduced their system of heating into every quarter of this country and to many foreign countries also

heater for hard or soft coal. The jacket diameter of this heater is $28\frac{1}{2}$ in.; inside diameter of fire pot, 16 in.; height of castings to flow pipe connections, $50\frac{1}{4}$ in. There is one opening tapped for a $2\frac{1}{2}$ in. flow pipe and another similar opening for the return pipe. This heater will supply 350 sq. ft. of direct radiation and its heating capacity is from 20,000 to 25,000 cubic ft. Of course the heating capacity depends very much upon the proper setting and piping as well as upon a sufficiency of good radiators, but when these conditions are complied with and a good quality of fuel used, the ratings of the heaters as given are guaranteed.

Catalogues of the Fuller & Warren Company's manufactures will be furnished upon application to the general office at Troy, or to any of their numerous branch offices.

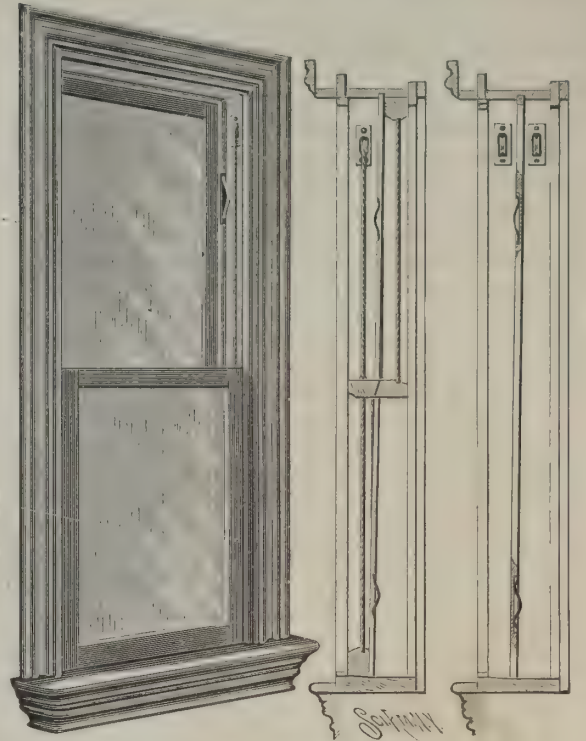
STAMPED STEEL CEILINGS.

The accompanying illustration shows one of the patterns of stamped steel ceilings manufactured by H. S. Northrop, of No. 30 Rose St., New York. It is of his $30" \times 30"$ sunk panel, with borders of his No. 1 diaper pattern, a "reeded" cove cornice, and a special size of embossed mouldings. The ceiling is in the hall of the Hancock St. school, Brooklyn—a room $40' \times 60'$ and 24 ft. high. Mr. Northrop has now ceiled eleven public schools in that city, besides many in New York, Jersey City, and other places. His catalogue embraces fourteen sizes of stamped panels, besides various borders, diaper patterns and cornices.

AN IMPROVED WINDOW FRAME.

The accompanying illustration represents, in front elevation and vertical sections, an improved construction of the sash slideways of window frames designed to effectually prevent draughts and the rattling of the sashes, which, when closed, will be firmly wedged in place. It has been patented by Mr. August Schmidt, of 1768 Amsterdam Av., New York City. The frame is of the ordinary pattern except in the slideways of the upper and the lower sash, of which the

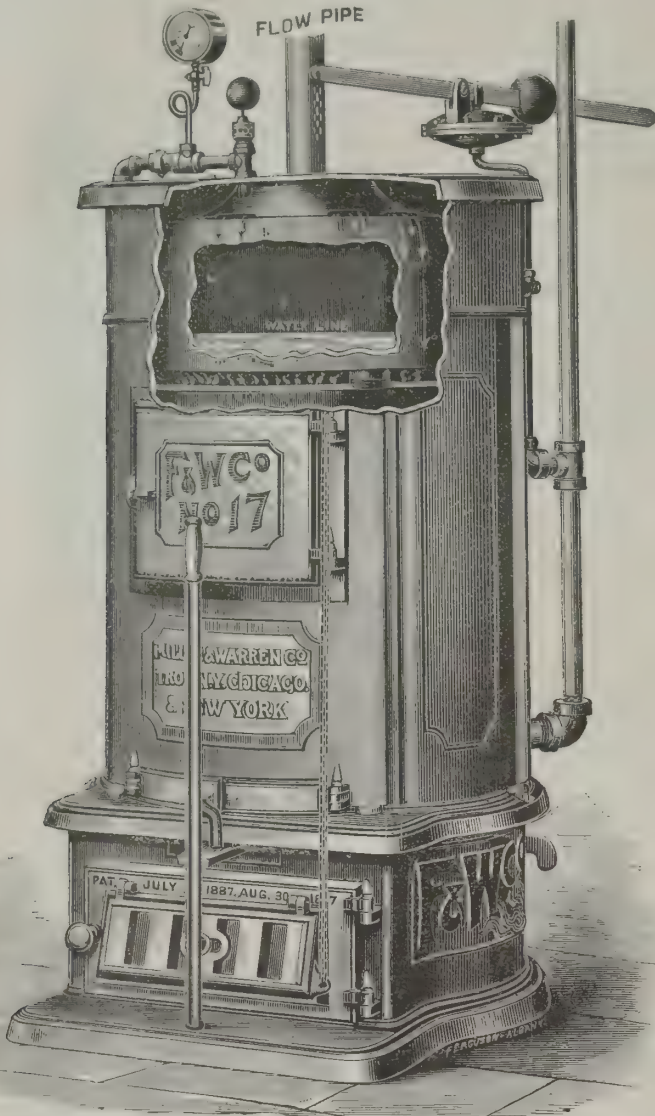
parting rail, instead of extending vertically from top to bottom of the frame, is placed diagonally, so that the upper portion of the slideway for the upper sash is narrower than the top portion of the slideway of the lower sash, while at the bottom the slideway of the lower sash is narrower, and that of the upper sash wider. The width of the slideway of each sash at the top and bottom approaches as nearly as possible that of the thickness of the top and bottom rails of the respective sashes. In the wide portion of each slideway a spring is placed in a recess in the parting rail, in such position that when the sashes are closed they will be firmly held



SCHMIDT'S WINDOW FRAME.

to prevent rattling and the wind from entering the room. As the taper of the sash slideways is very gradual, the sashes are designed to be freely moved without binding, so that they can be easily raised and lowered, while the springs enable the sashes to be held in any desired position in the wider portions of the slideways without exerting tension at all times on the sash cords.

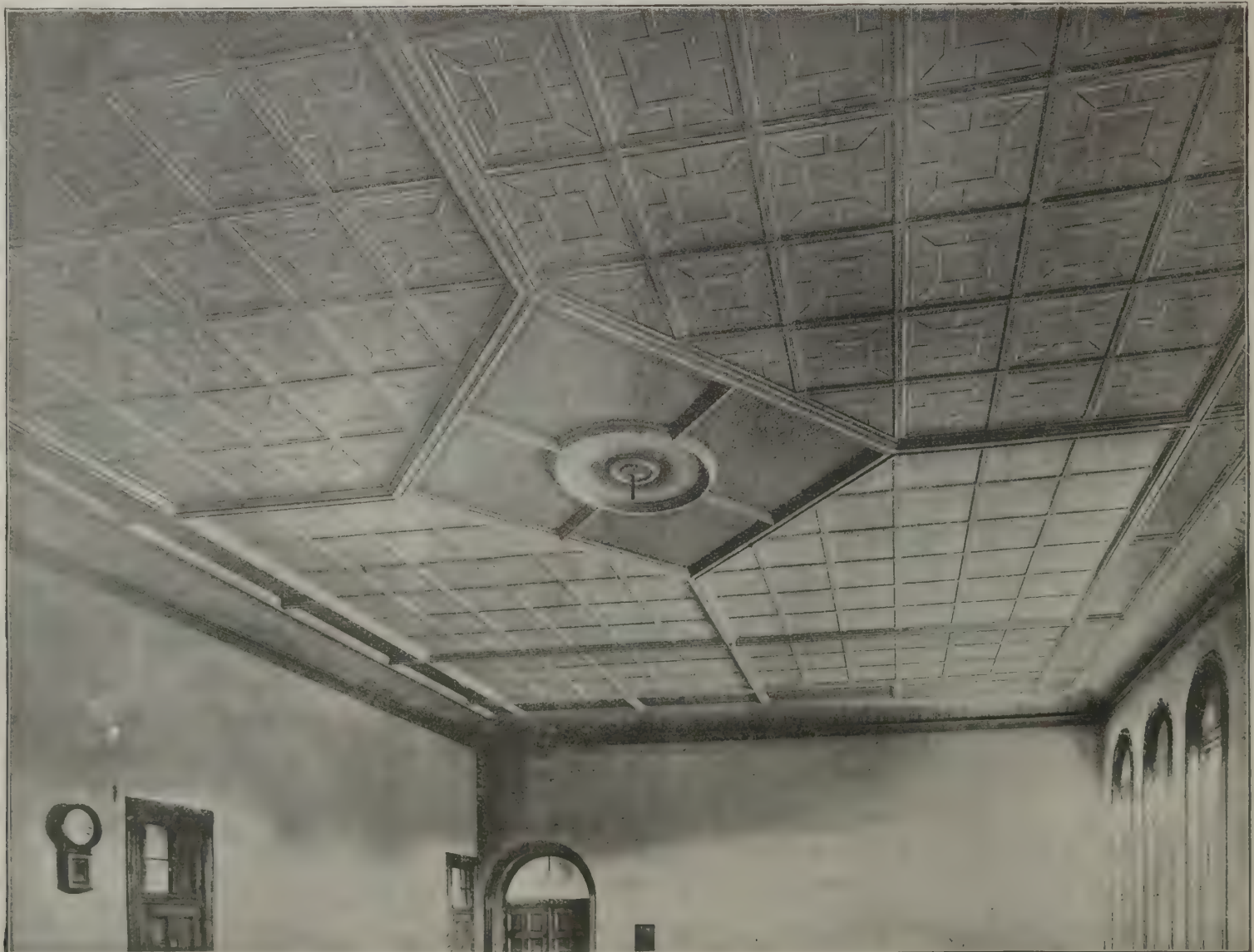
CHERRAPONGEE, in southwestern Assam, is the wettest place in the world. In 1861 the rainfall there reached 905 inches.




THE FULLER & WARREN No. 17 STEAM HEATER.

The Fuller & Warren Company manufacture hot water heaters, steam heaters, combination hot water and warm air furnaces, besides stoves, ranges, etc., in great variety. The illustration herewith is the No. 17 steam

wedged in place. It has been patented by Mr. August Schmidt, of 1768 Amsterdam Av., New York City. The frame is of the ordinary pattern except in the slideways of the upper and the lower sash, of which the



A STEEL CEILING IN A BROOKLYN PUBLIC SCHOOL.



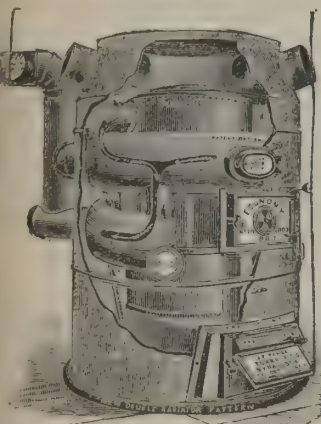
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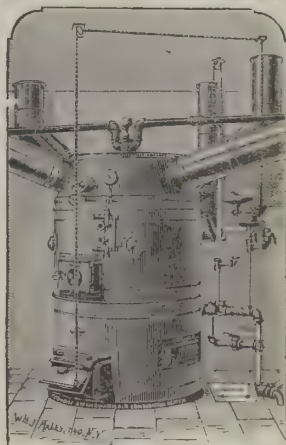
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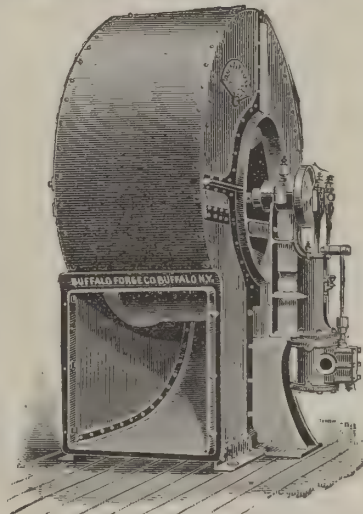
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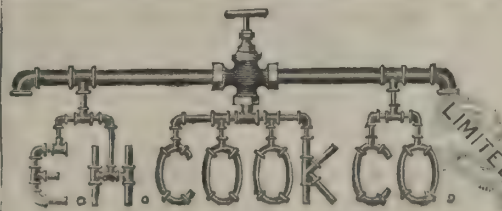
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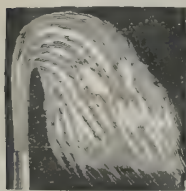
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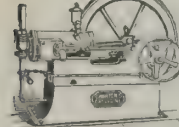


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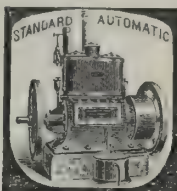
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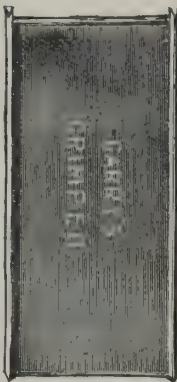


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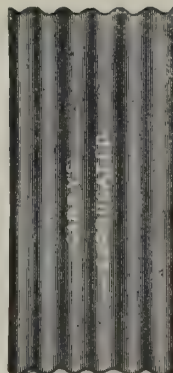
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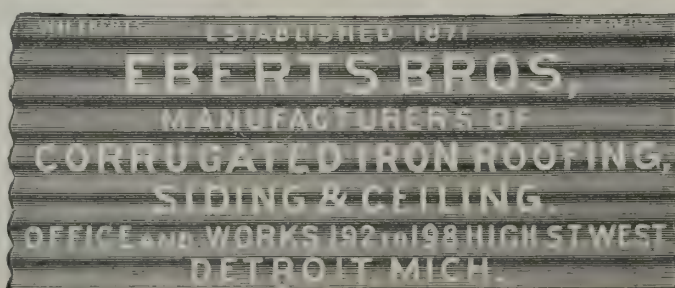
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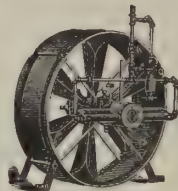
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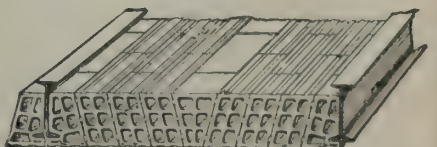
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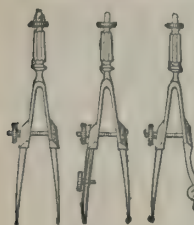
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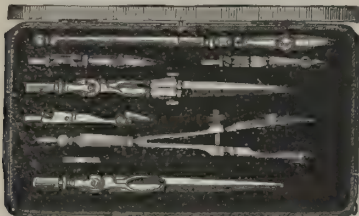
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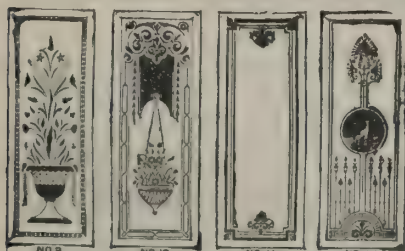
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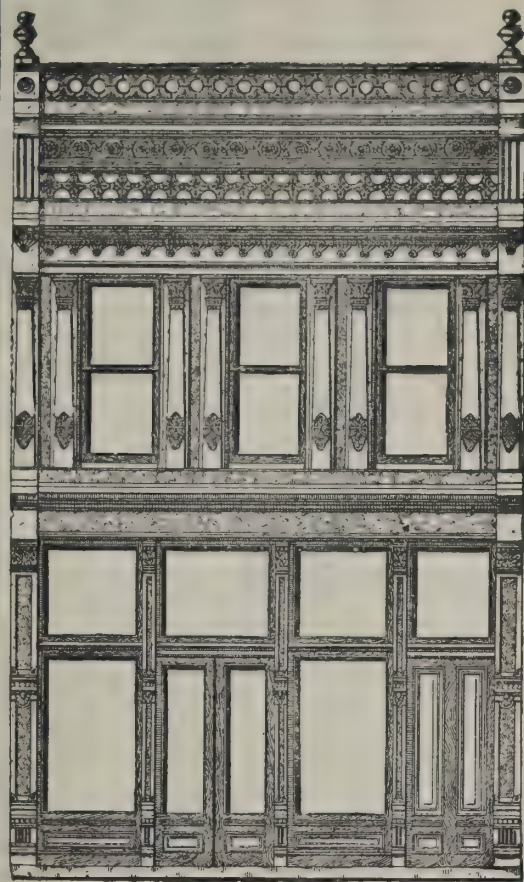
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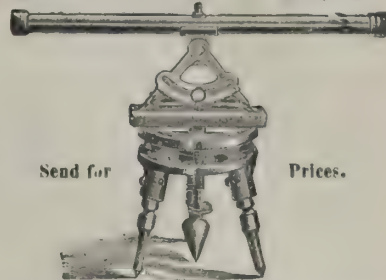
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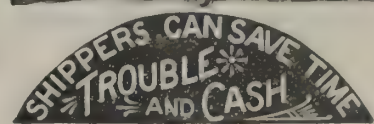
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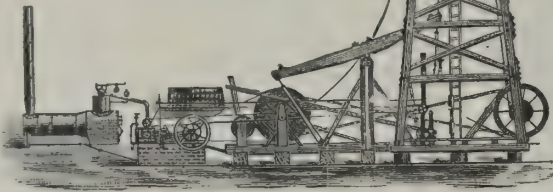
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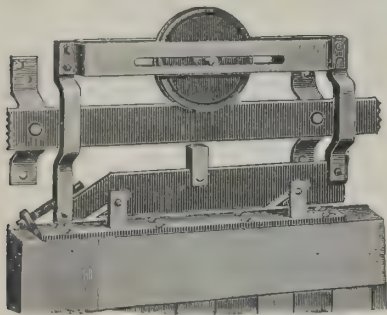
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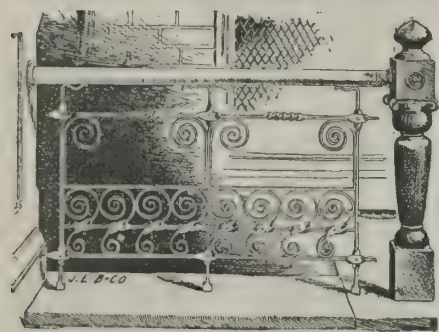
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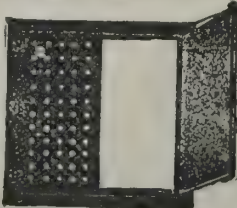
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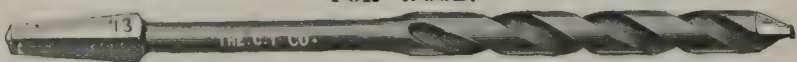
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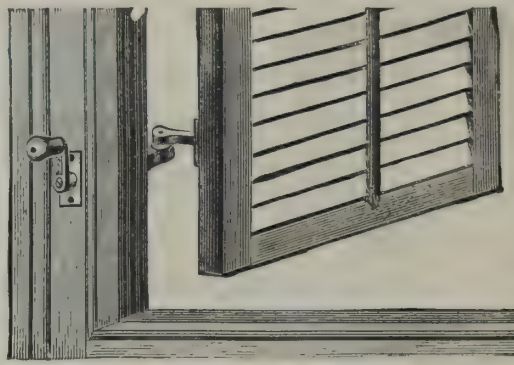
(1) D. S. writes: The elm with us is infested by some insect; a majority of the leaves are like the one I inclose herein. What are the cause and remedies for it? A. It is impossible without better specimens to say precisely what the insect is, but we think likely that it is the canker worm, which injures the elm as well as the apple tree. The most approved remedies are as follows: To prevent the pests from going from tree to tree, a band of canvas or paper is wrapped around the trunk and smeared with tar or a mixture of tar and molasses, which must be frequently applied; or a band of rope or closely twisted hay is put around the trunk and over this a tin band about 4 inches wide, so placed that the rope shall be at the middle of the two, in such a manner that there will be a cavity below and a free edge above it. If these insects are prevented from ascending the tree, they will deposit their eggs below the obstruction and near it, and the eggs can be destroyed by a single application of kerosene oil. This should be done about March in this latitude, and earlier further south. If the worms have been permitted to hatch, as soon as they are large enough to be seen jar them from the trees and sweep away with a pole, as they hang by their threads, and burn for otherwise destroy them. If the worms have matured and gone into the ground for winter quarters, plow the ground late in the fall, so as to expose the pupae to frost and to their natural enemies. See also Professor A. S. Packard's article on the canker worm, page 304 of the SCIENTIFIC AMERICAN SUPPLEMENT, No. 19.

(2) S. L. G. writes: A kerosene lamp is broken on the floor, saturating the carpet and floor with oil. How can it best be removed? A. If the oil has recently been spilled, put on plenty of wheat flour or whiting to absorb the oil as much as possible. If the spot is near a seam, it is well to open the carpet and place the whiting underneath as well. Next day sweep up the floor above and beneath the carpet with a stiff brush, and put on plenty of fresh flour. If spots persist in remaining after this treatment, they can be removed by rubbing with flannel dipped in spirits of turpentine or benzine. Others use a preparation made by mixing a little soap into a gallon of soft, warm water, and then adding half an ounce of borax. Wash the part well with a clean cloth, and the spot will soon disappear.

(3) J. F. L.—Water meters are read in the same manner as gas meters. The 1st dial is cubic feet up to 100; 2d dial is cubic feet by 100 for each figure; 3d dial 1,000 cubic feet for each figure, and so on to the 6th, each dial indicating 10 times the amount of the whole of the preceding dial. Always read the figure behind the index in the direction that it moves. The index hands alternate to the right and left in their motion to accommodate the plan of gearing.

(4) W. B. M.—You may return the water of condensation to the boiler under the conditions that you name. You will need 1 1/4 inch pipe from boiler to near the radiators, and distribute to radiators with 1 inch pipe. The return to boiler may be 1 inch pipe, with 3/4 inch branches to each radiator. Only ordinary valves upon the radiators, with a check valve near boiler. If you have air valves upon each radiator and a small blow-out valve near the boiler, so as to get

(Continued on page vi.)



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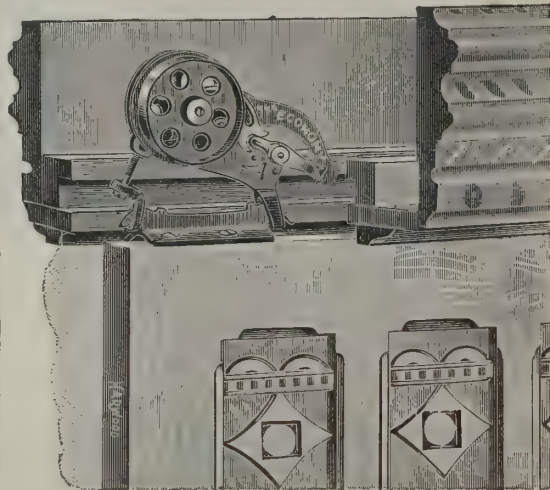
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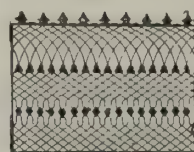
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(Continued from page iv.)

rid of the air in the return pipe when you turn steam
into the heating pipes, you will need only one precau-
tion in its management, viz., always remember that the
water returns by gravity only, which makes it necessary
to keep the steam at the full boiler pressure upon the
radiators, otherwise the water will back up into the
radiators until the proper gravitating balance is obtain-
ed. No throttling of the steam at the boiler valve will
succeed with a gravity system.

(5) A. C. asks for the best known
method of cleaning fine wall papers and frescoes. A.
In many cases they are uncleanable. Bread crumb is
about the safest application. Much depends on the na-
ture of the surface. Some walls can be washed with
soap and water.

(6) M. G. asks if there is a solution by
which flies can be kept away from show windows and
mirrors. A. Not that will have any permanent effect;
their number can be reduced by using fly paper and
various kinds of traps.

(7) G. J. S. asks: How can I find the
height of hills above the sea? A. The measuring of
the heights of hills and mountains from the level of the
sea would be a difficult problem for you to manage unless
you were fairly versed in trigonometry and have a
theodolite. The heights are sometimes obtained by
means of a barometer; observation being taken at
base and then at top of mountain, and the difference
calculated. We recommend you to get a book on
trigonometry, illustrating the methods for distances
and heights.

(8) C. N. S. asks the best plan to moisten
the atmosphere of a closet or chest by cold water alone?
A. By rearranging the shelves you might get room
enough next to the top above the shelf to slide in a
shallow tray of water, with partitions standing about 2
inches above the water, with cotton or linen cloth folded
over them so as to dip into the water, which will great-
ly increase the surface for evaporation. The shelves
should be of slats, or with an open space at the back
and front for circulation of the moist air.

(9) L. S. asks for a formula for a stain,
and method of applying same, that will make a good
imitation of red cedar, on elm or other light colored
woods. A. Either of the following will probably an-
swer: 1. Boil ½ pound madder and ¼ pound fustic in
1 gallon water; brush over the work, when boiling hot.

(Continued on page vii.)

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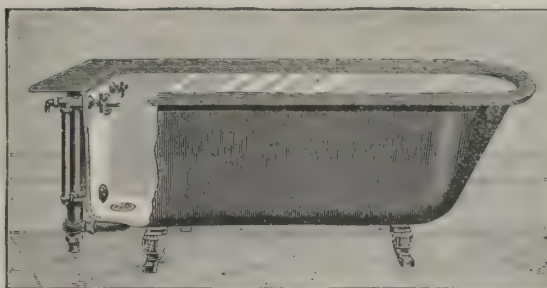
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(Continued from page vi.)

until properly stained. 2. The surface of the wood being quite smooth, brush over with a weak solution of aquafortis, $\frac{1}{4}$ ounce to the pint, then finish with the following: Put $\frac{1}{4}$ ounces dragon's blood and 1 ounce soda, both well bruised, to 3 pints spirits of wine, let it stand in a warm place, shake frequently, strain, and lay on with a soft brush, repeating until of proper color; polish with linseed oil or varnish.

(10) J. C. H. asks: Is there any cheap method by which asbestos felt can be made waterproof? That is, saturated completely and thus rendered impervious to water? Can this be done and the material still be at all pliable, or will it be rendered stiff? If the felt can be made waterproof in sheets, and boxes or tanks are desired to be made of it, what material should be used to cement the joint seams or corners? A. We think the following would accomplish your purpose. A mixture is prepared consisting of 60 parts of resin, 80 parts of tallow, 5 parts of wax, and 5 parts of turpentine. Soak the asbestos felt in this mixture, and it will become waterproof. Several processes for waterproofing cloth may be found in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 317, which will afford you some in-

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formation on this subject. This lining cannot be cemented, but only joined by same or similar material; we should think asbestos not a very suitable material for tank lining.

(11) L. H. C. writes: My lawn, not of great extent, is completely covered with dandelions, which are choking out the grass. Lawn was richly manured last fall, and they seem to thrive upon it. Can you or any of your readers suggest a method of killing them out? A. We know of no better way to eradicate dandelions in a lawn than to cut them out with a long, narrow knife. Run the knife down beside the root, loosening as much as possible of the root, and pull it out. The next best is to resod the lawn.



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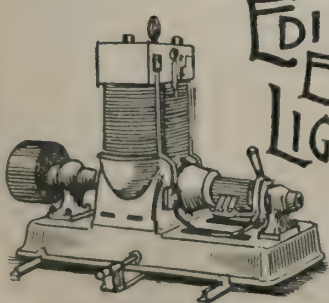
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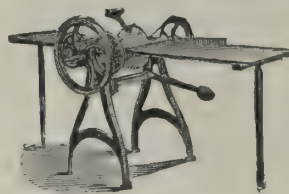
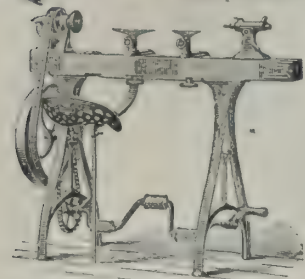


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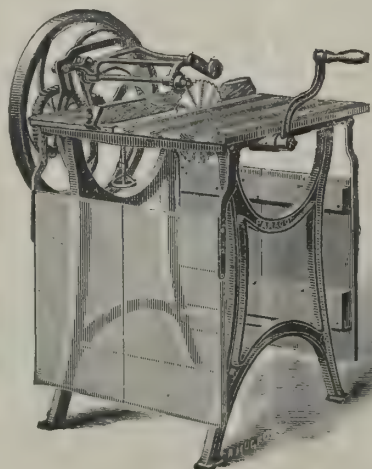


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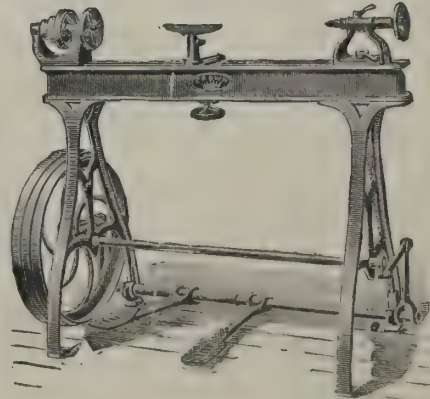
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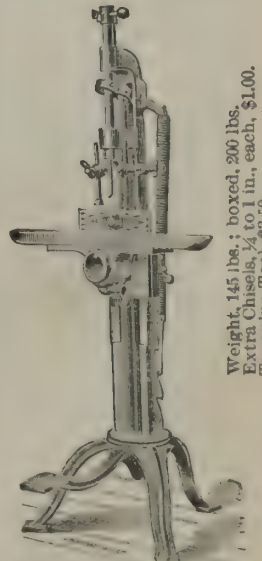


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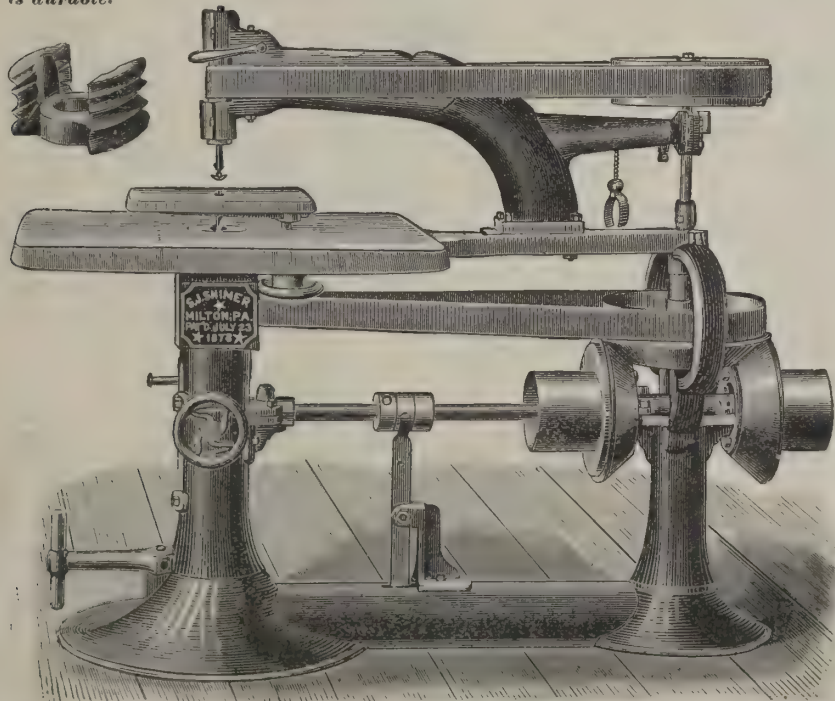
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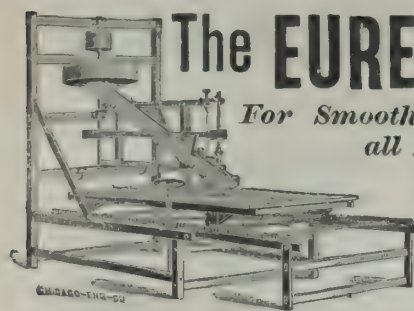
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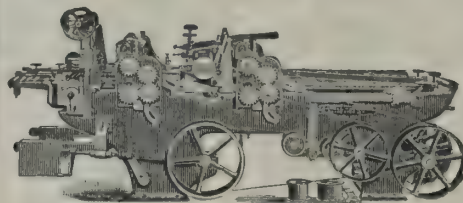
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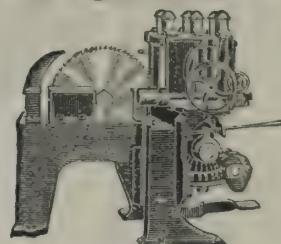
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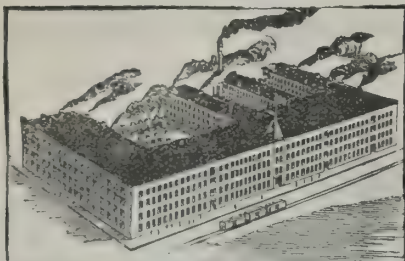
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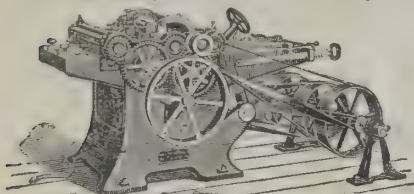
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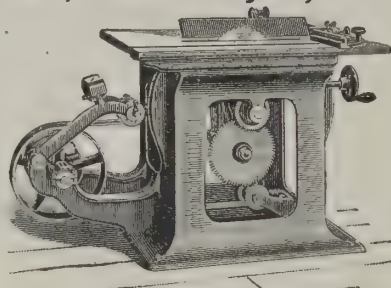
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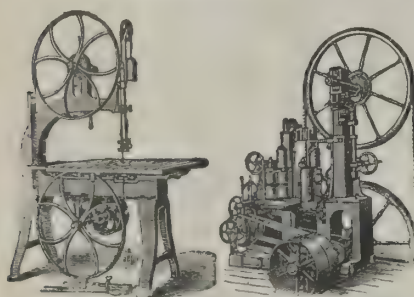
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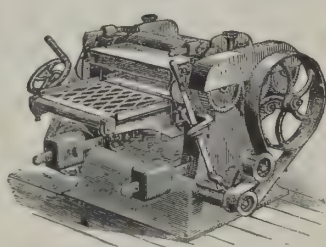
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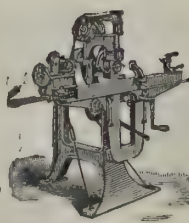
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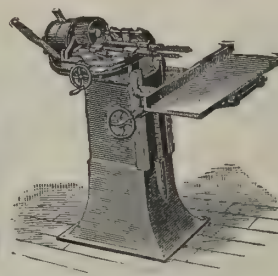
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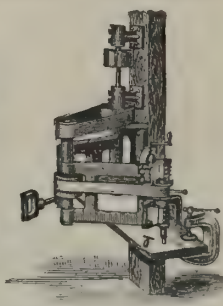
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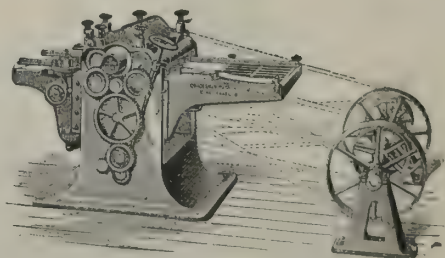
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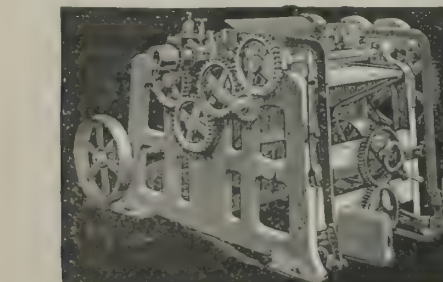
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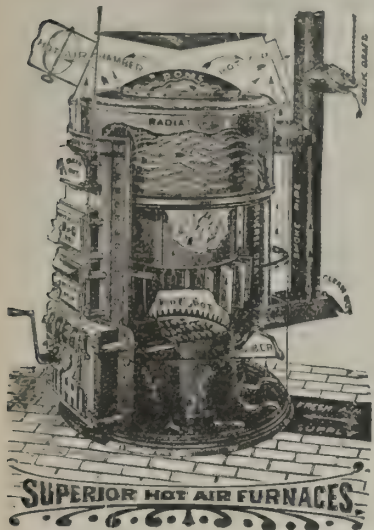
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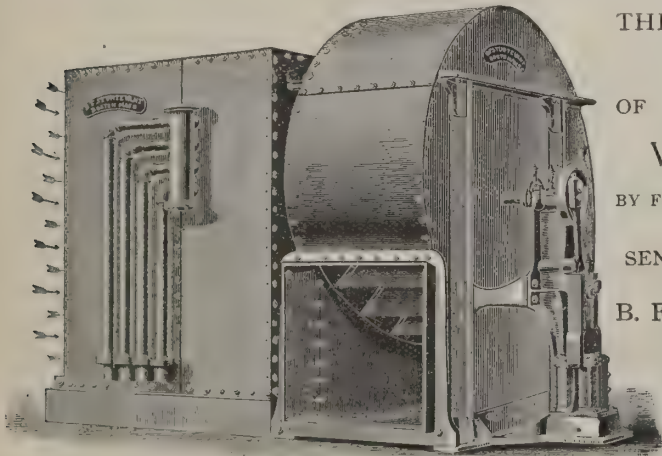
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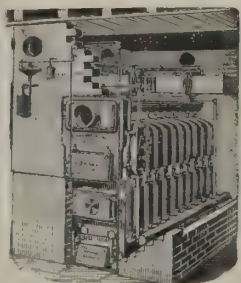
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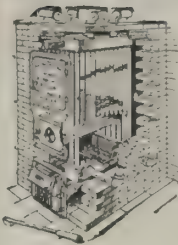
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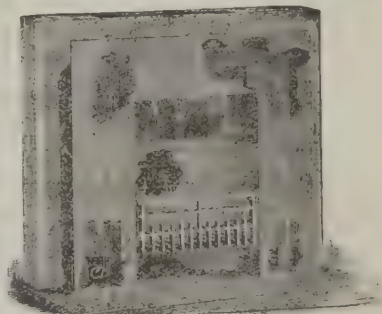
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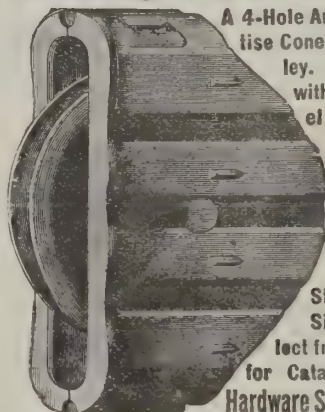
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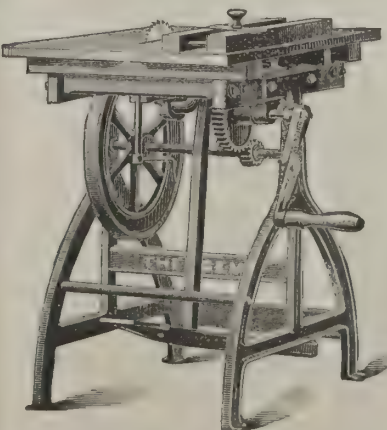
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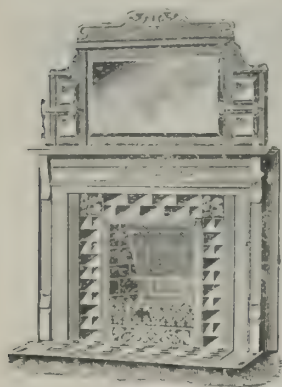
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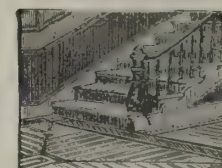
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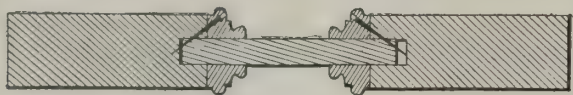
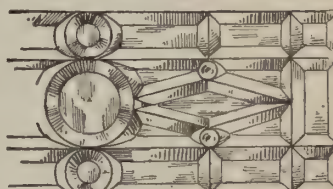
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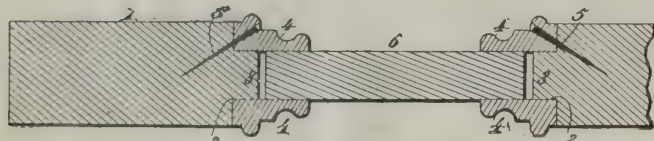
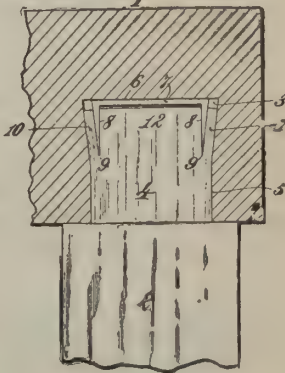
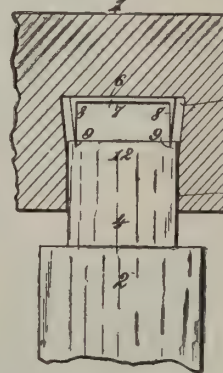
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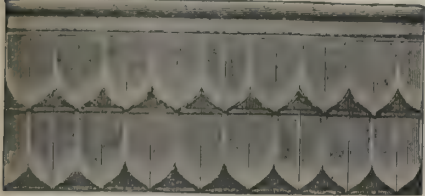
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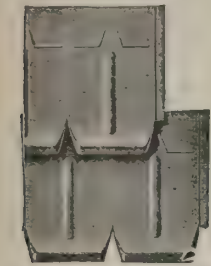
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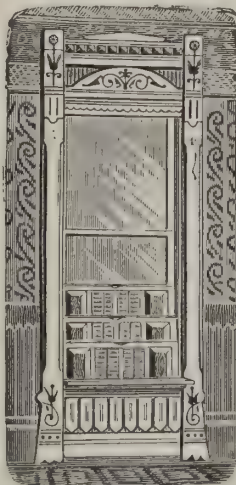
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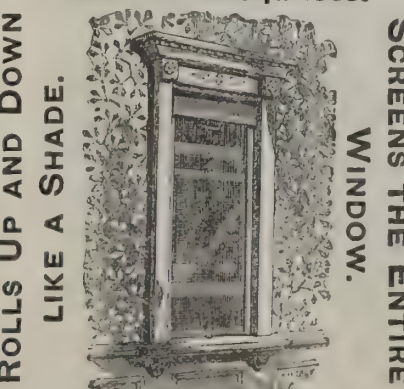
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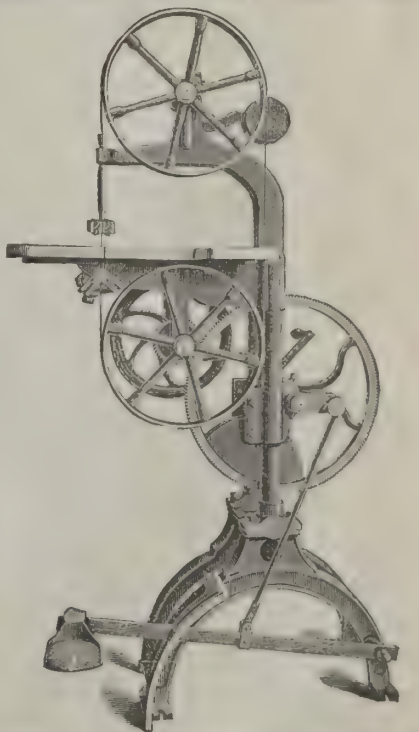


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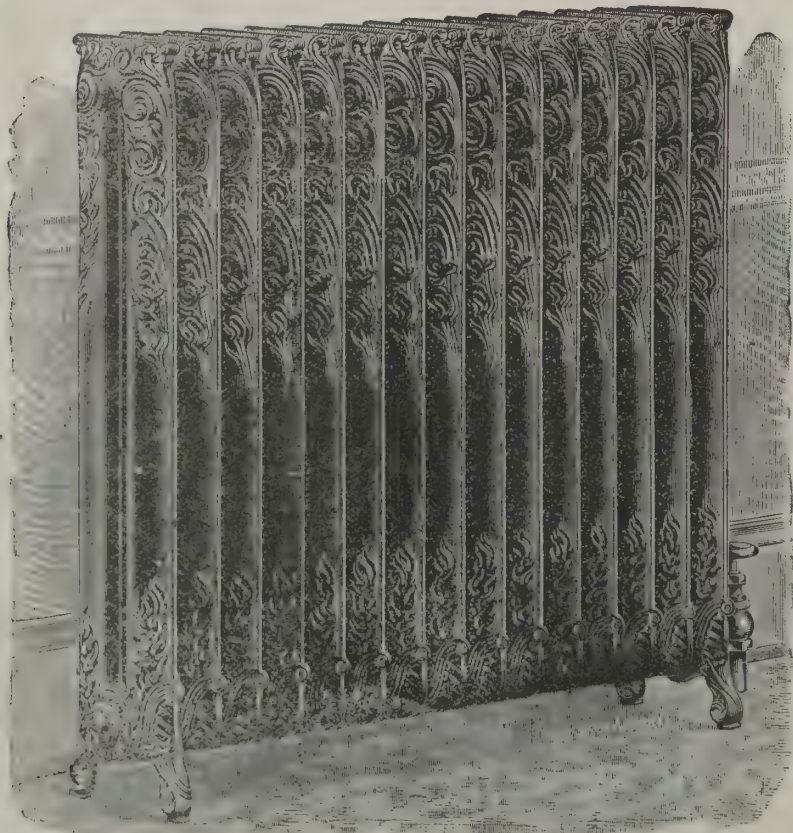
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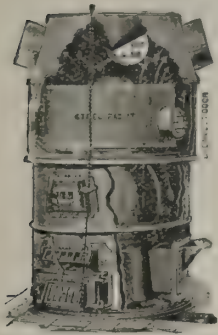
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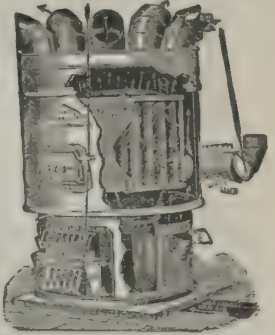
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Change of copy for advertisements should reach us not later than 10th of month to appear in issue following.

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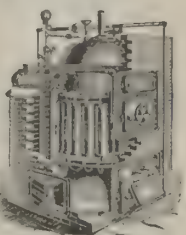
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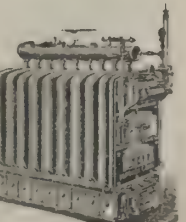


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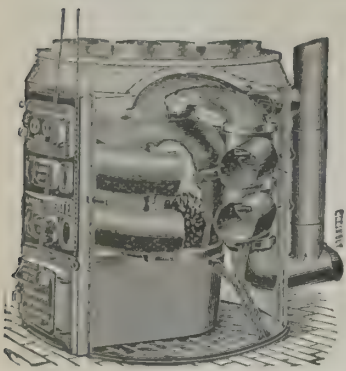
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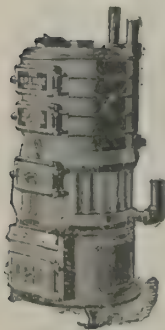
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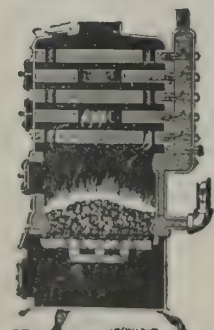
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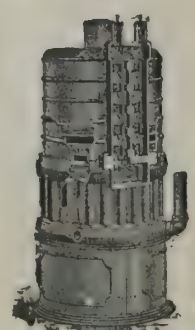
"SPENCE" HOT WATER HEATER



Note attractive design.



Note complete arrangement of flues.

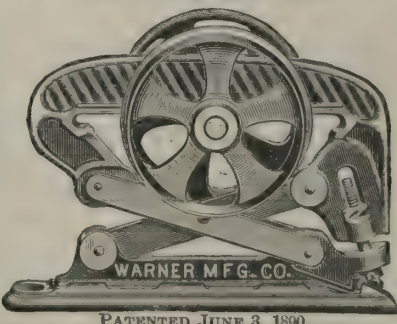


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ADJUSTABLE,
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Will not leak.
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Made of two seamless
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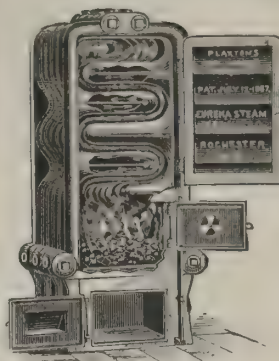
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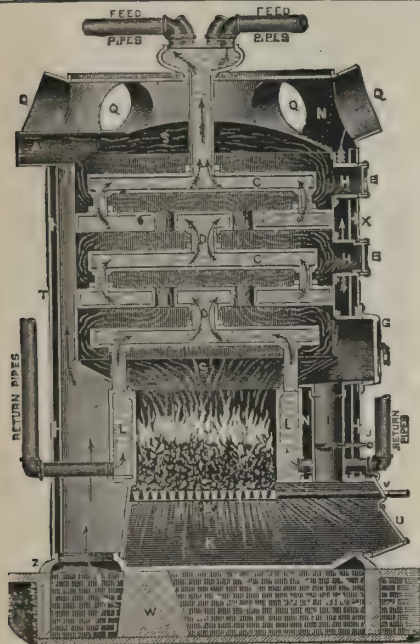
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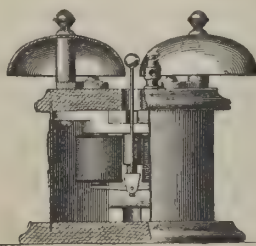
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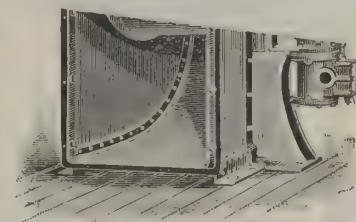
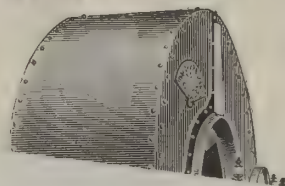
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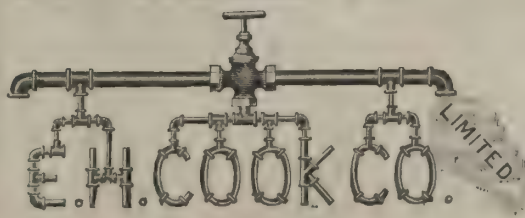
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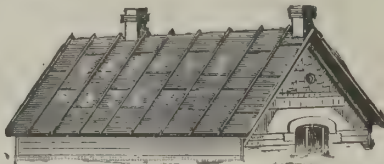
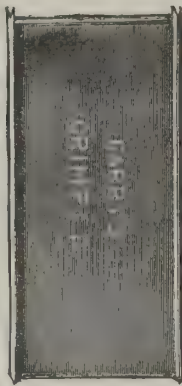
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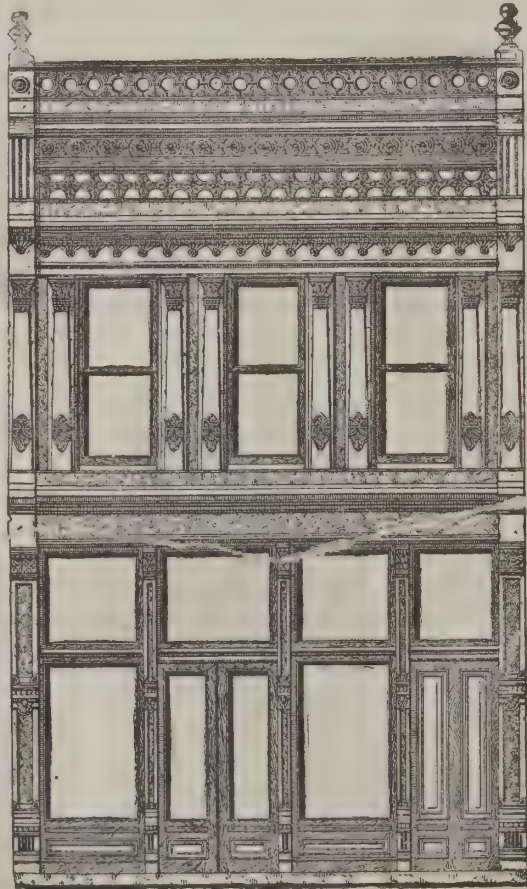
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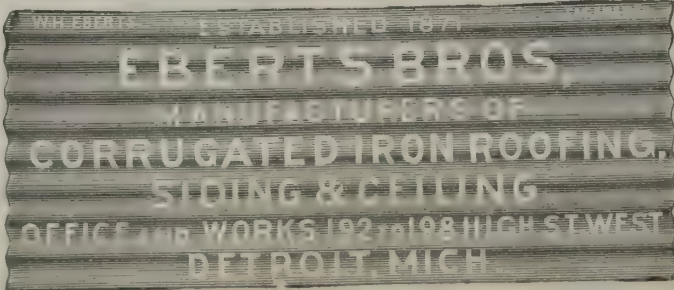
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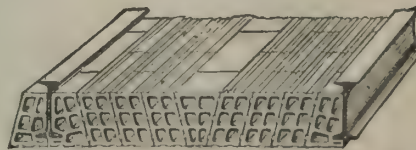
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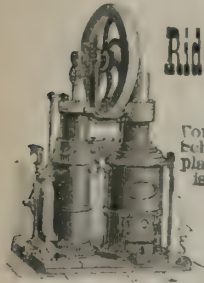
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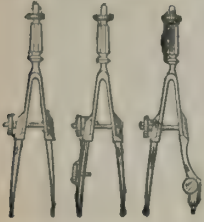
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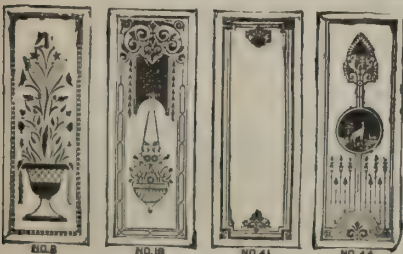
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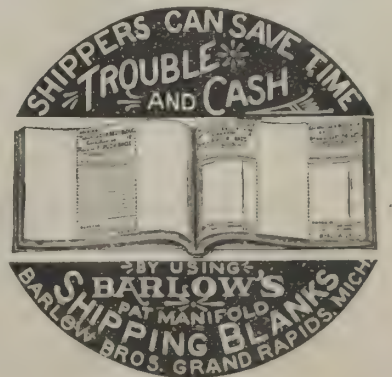
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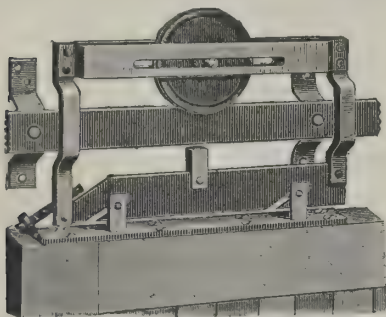
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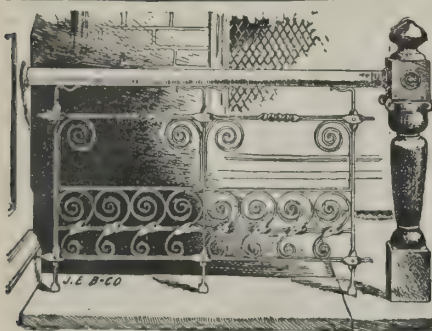
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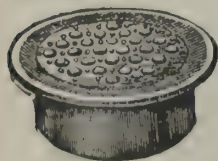
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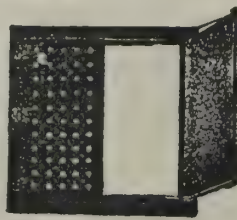
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(Continued on page vi.)



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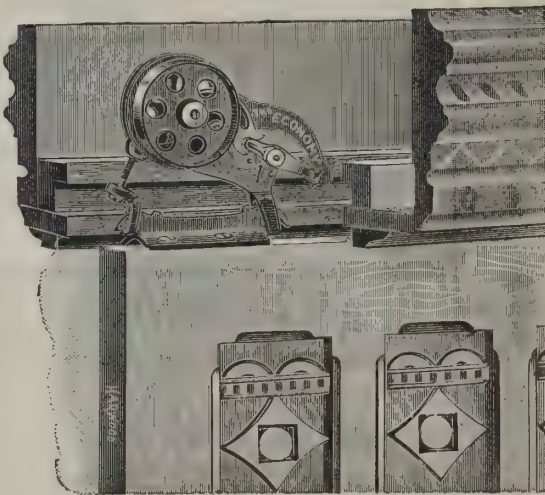
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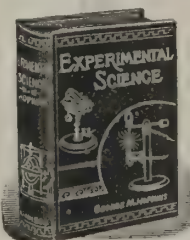
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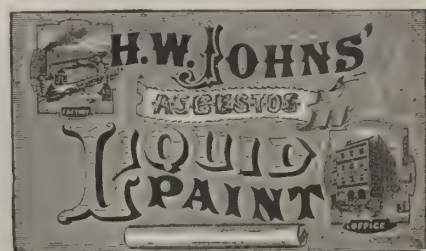
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(Continued from page iv.)

(5) N. C. H. A.—Concrete wall such as you propose would make a good foundation for your barn. Use one part best cement and 3 parts clean sharp sand. You can figure the quantities from the above. For prices write to dealers.

(6) S. L. asks: 1. Which is the best non-conductor of heat—felt, asbestos, or air? A. Asbestos. 2. Will air inclosed in a vessel hermetically sealed expand by heat? If so, how much, and with what force? A. Air, at atmospheric pressure and with a temperature of 32° Fah. will, when heated to 680°, give a pressure of 15 pounds above that of the atmosphere. 3. Is a partly vacuum a better non-conductor of heat than air? A. Yes. 4. What causes the explosion of kerosene lamps, and stoves? Is it because the gas from the oil comes in contact with the oxygen of the air or with the flame? A. The explosion of kerosene lamps and stoves is caused by the mixture of petroleum vapor driven off by the burner and air. 5. Which is the lightest of all gases? A. Hydrogen. 6. If a vacuum were created in a vessel, would it be lighter than if charged with the lightest gas? A. Yes.

(7) C. A. C. asks for a receipt for cleaning marble headstones that have been blackened by age and from trees, one that will not leave the stone yellow; also one for granite curbing. A. Cover the soiled part with a paste of quicklime moistened with a strong aqueous solution of sal soda for several hours, then remove the paste, wash the parts thoroughly, and polish if necessary.

(8) F. W. V. says: I have a ranch here, at Colton Station, Nebraska, of 3,000 acres, 2,000 of which I want to water so as to raise hay. I would like to know what would be my cheapest way to raise water 50 feet for this purpose, and what kind of power would be required, and what it would cost. There is water enough to be had. The large Pole Creek runs through 600 acres, but it does not reach the 2,000. The water lies near the surface. Irrigated land here produces 2 tons to the acre. A. If you can get a waterfall, a wheel and pumps will be easiest and cheapest to care (Continued on page vii.)

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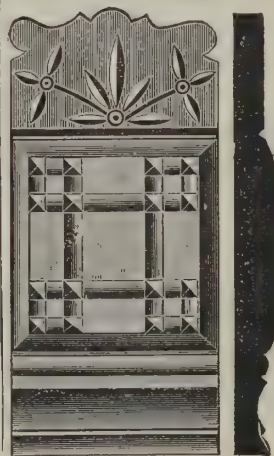
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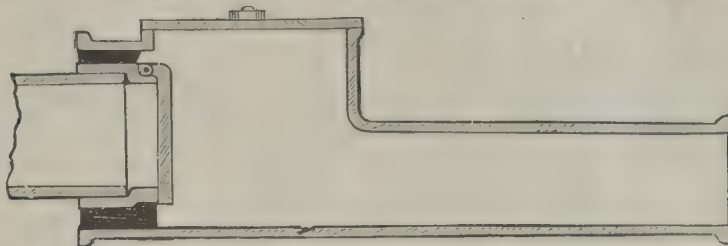
(Continued from page vi.)

for, but would require a large storage reservoir somewhere on the higher part of the ranch, so that a small wheel or power constantly running would do an average work. If water power cannot be had, windmills or steam pump would next be in order. Windmills require no fuel and are easy to care for. They can be put in various places and be made to lift by stages from one canal to another and save pipe laying.

(9) E. B. H. asks: How are bricks enameled, and what kind of enameling is used? What coloring matter is used to variegate the colors? A. Enamel for bricks is composed of powdered flint glass 200 parts, carbonate of soda 41 parts, boracic acid 12 parts. The face of the brick is sized with glue size, the enamel is then applied in solution, and fused in an oven. The enamel is colored with the metallic oxides. We refer you for further information to "Bricks, Tiles, and Terra Cotta," by C. T. Davis, which we can mail you for \$5.

(10) R. P. writes: I observed a man cleaning a papered ceiling a few days ago. He used apparently a ball of ordinary bread dough, but as the

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work was being done rapidly and easily, I supposed there was some chemical used in the composition. The paper was brought out as bright as new. Will you kindly inform me through your valuable paper what composition will do this work? A. No chemical is to be advised for cleaning wall paper. Try a ball of bread crumbs.

(11) J. B. asks: Does a lightning rod attract lightning? "A" says it attracts first and then conducts. "B" says it does not attract, but only conducts. A. It is supposed that the main function of a pointed lightning rod is to diffuse the earth's charge and thus prevent the violent union of the electricity of the clouds and the earth. The rod when struck conducts the charge to the earth.

(12) J. S. R. asks (1) as to the obelisk (in Central Park, New York), and also the Pyramids of Egypt. Are they not generally considered (by scientific men) a composition, and not blocks of natural stone? A. They are natural stone, not an artificial composition. 2. What was the date of publication of the first number of SCIENTIFIC AMERICAN? Was it a monthly paper, or magazine, in its youth? A. September, 1845. It was a weekly.

(13) A. G. asks: 1. What is infusorial earth? A. Siliceous skeletons of diatoms. These represented a low form of animal life, and infusorial earth is made up of remains of their microscopic skeletons. 2. What are its uses? A. Principally as a polishing agent, as an absorbent for explosives, and in brick and tile and stoneware making. 3. What is its commercial value? A. About \$5 per ton. 4. Can sulphate of aluminum be easily and cheaply reduced to merchantable metal? A. No; but it should be of value for the manufacture of alum. 5. Is the Cowles method applicable in reduction of same? A. No.

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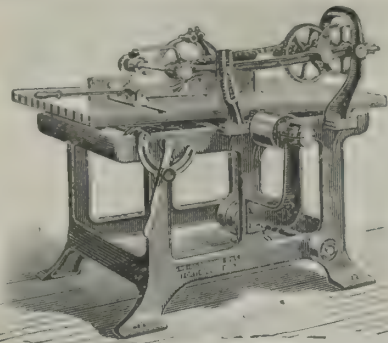
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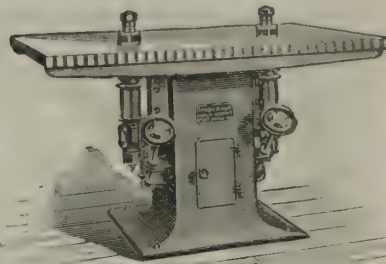
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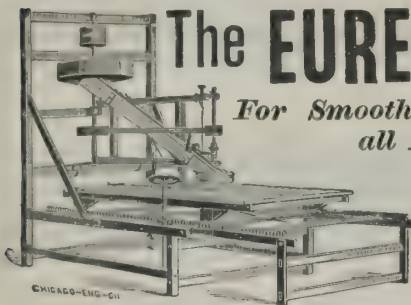
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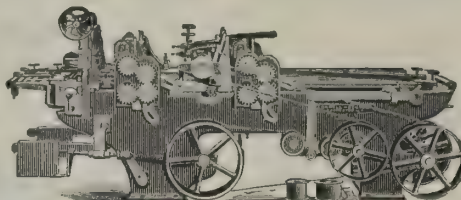
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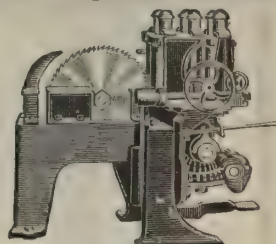
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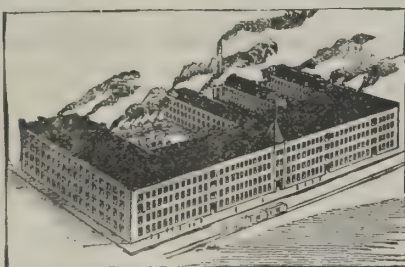
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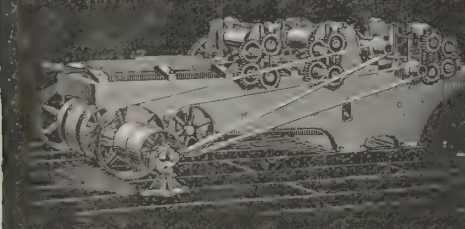
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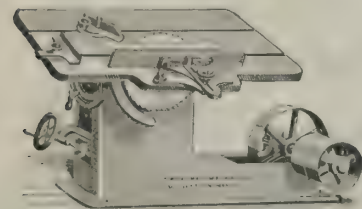
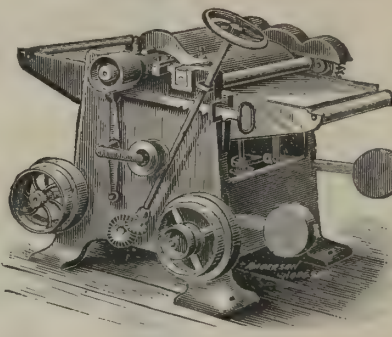
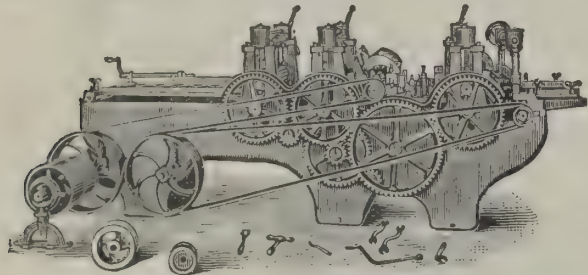
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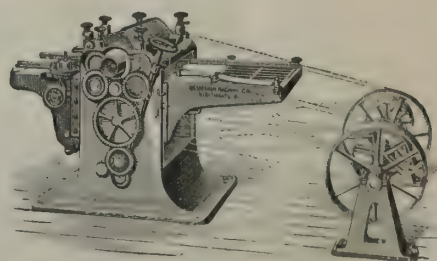
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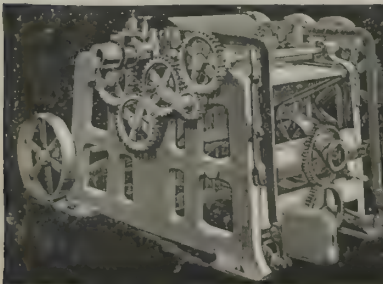
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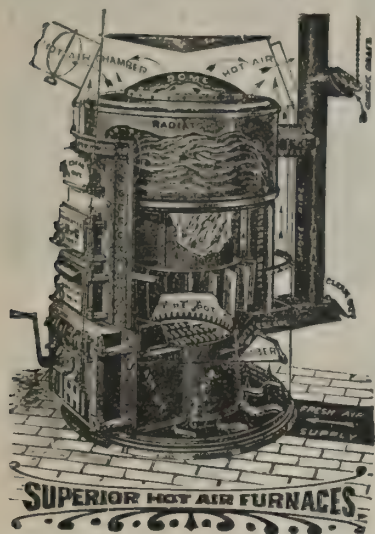
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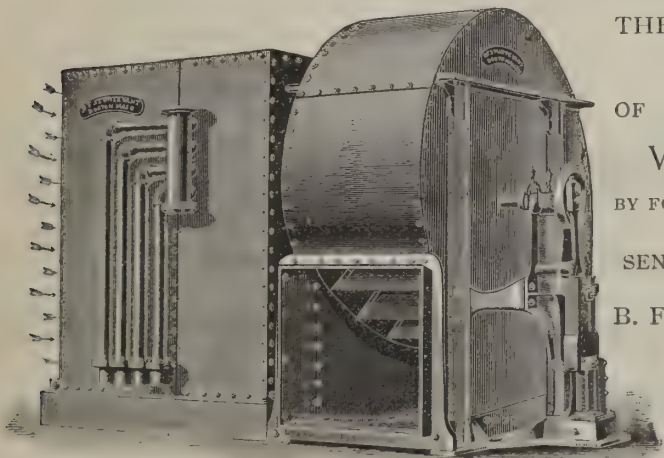
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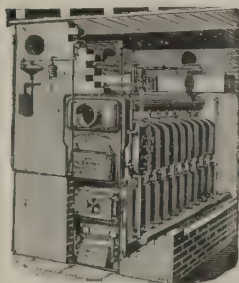
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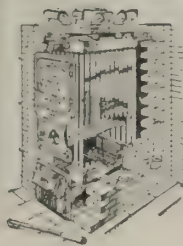
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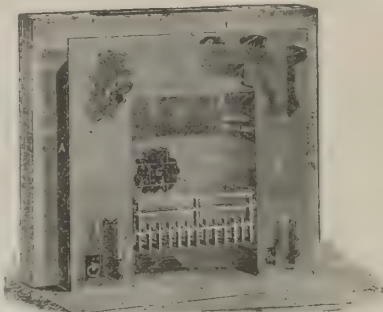
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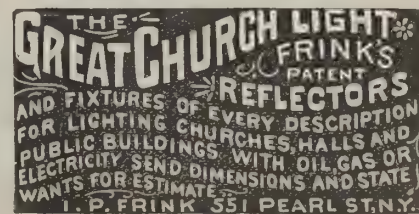
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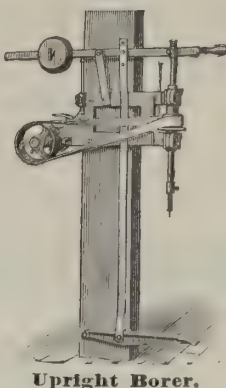
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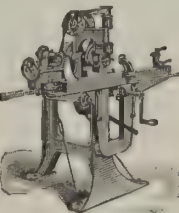


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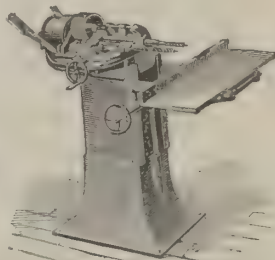
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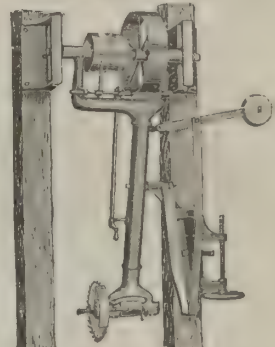
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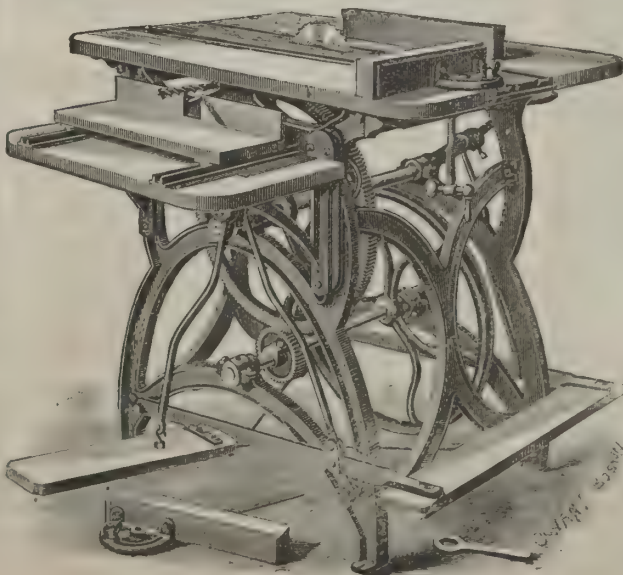
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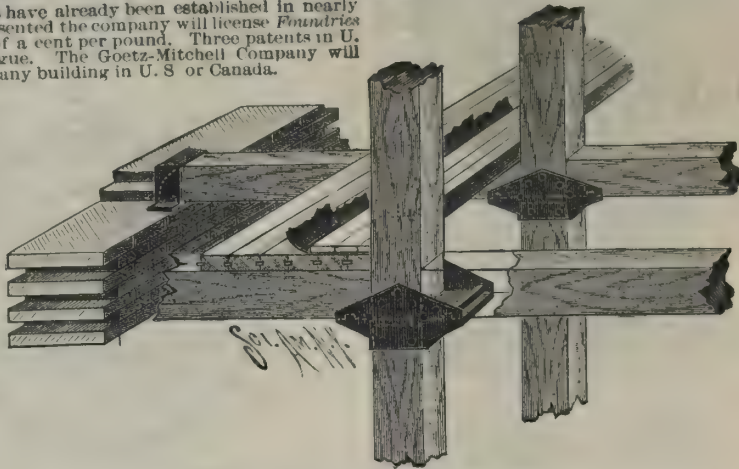
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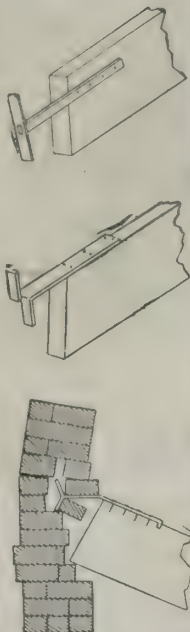
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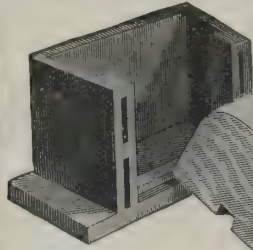
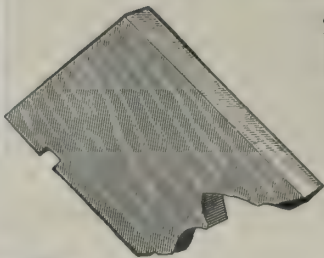


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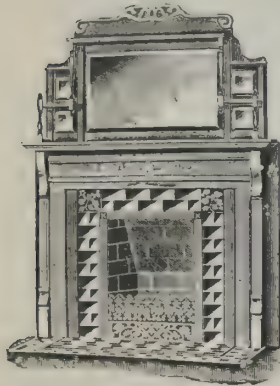
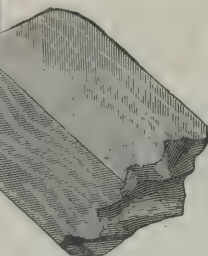
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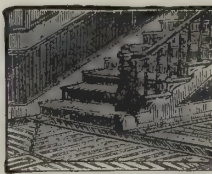
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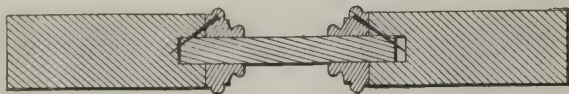
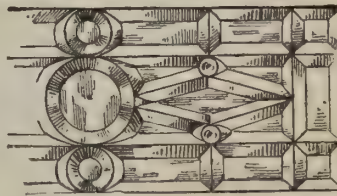
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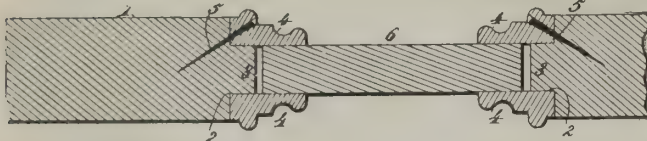
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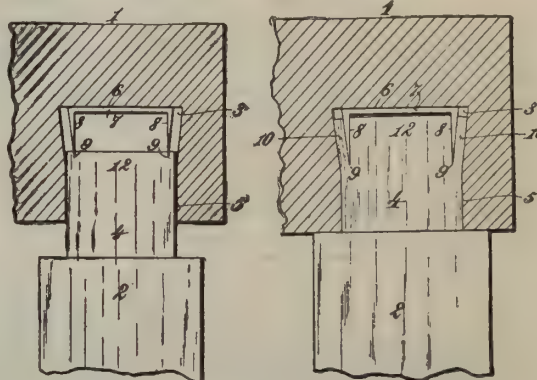
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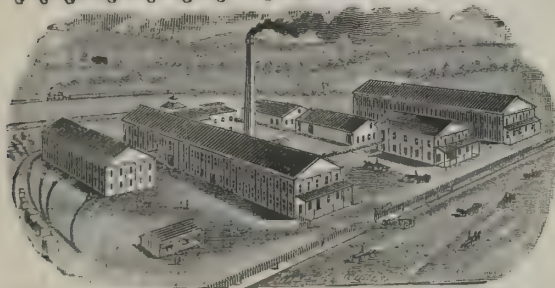
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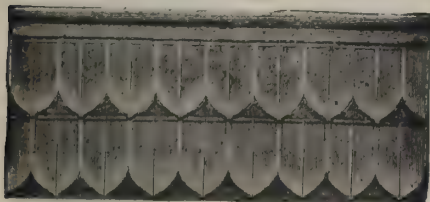
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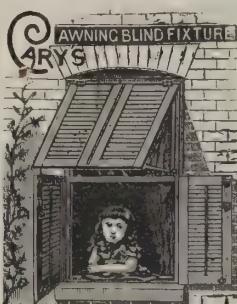
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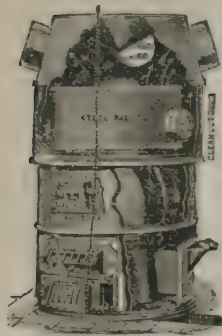
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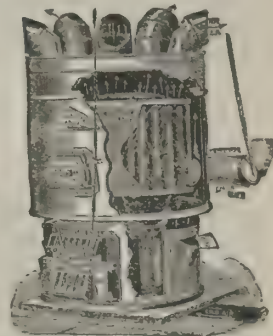
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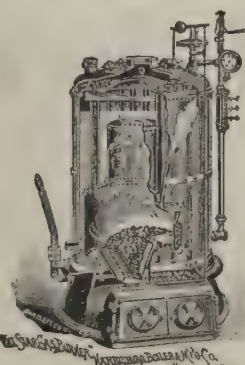


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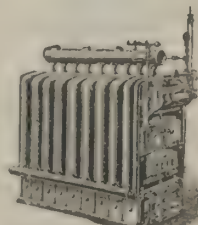
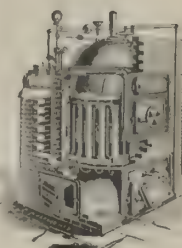
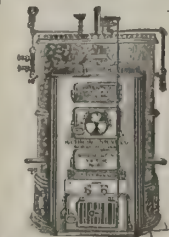
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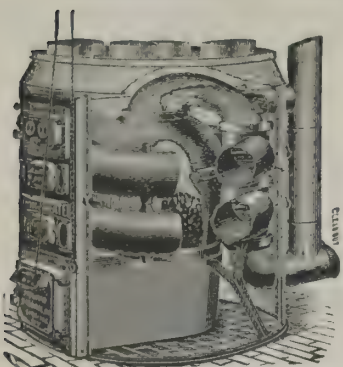


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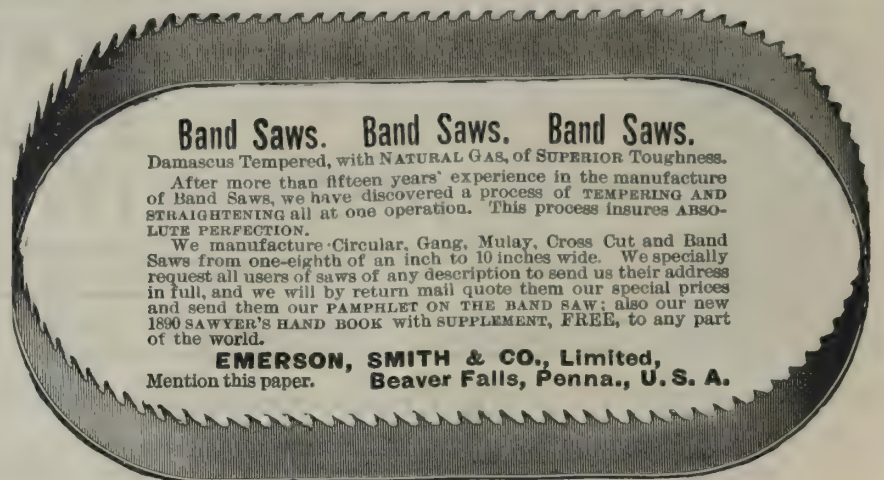
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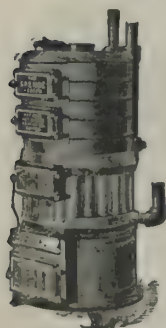
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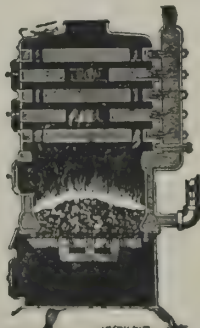
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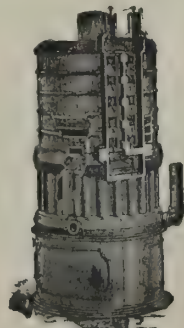
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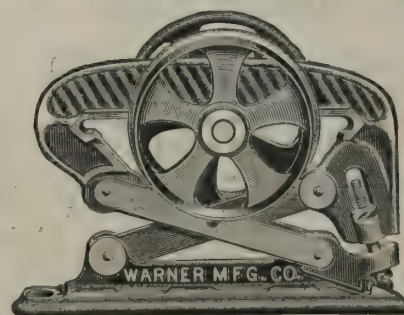
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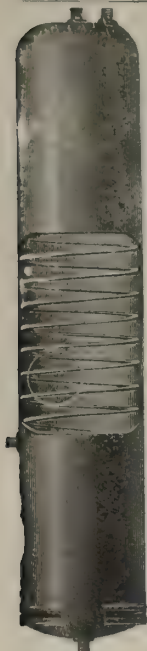
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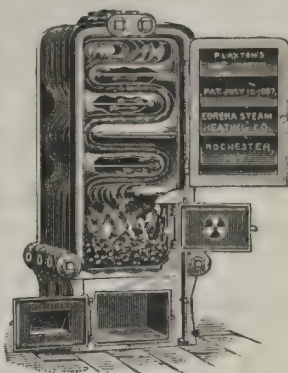
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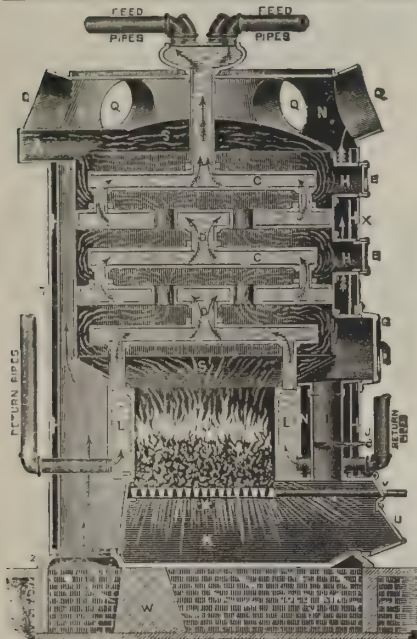
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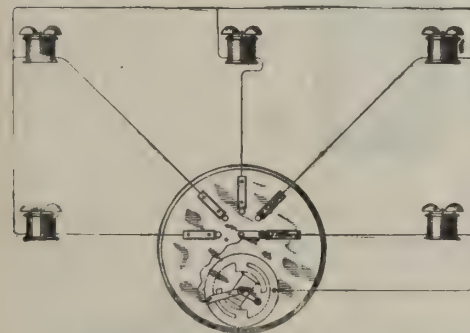
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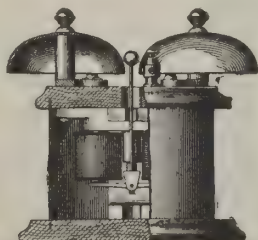
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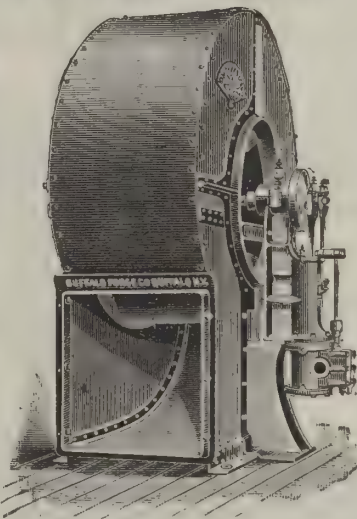
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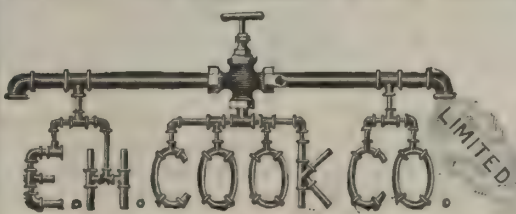
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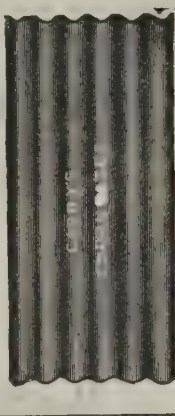
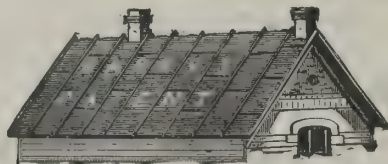
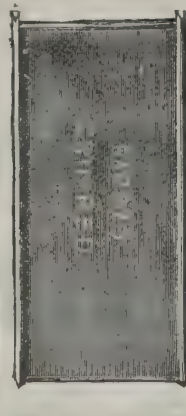
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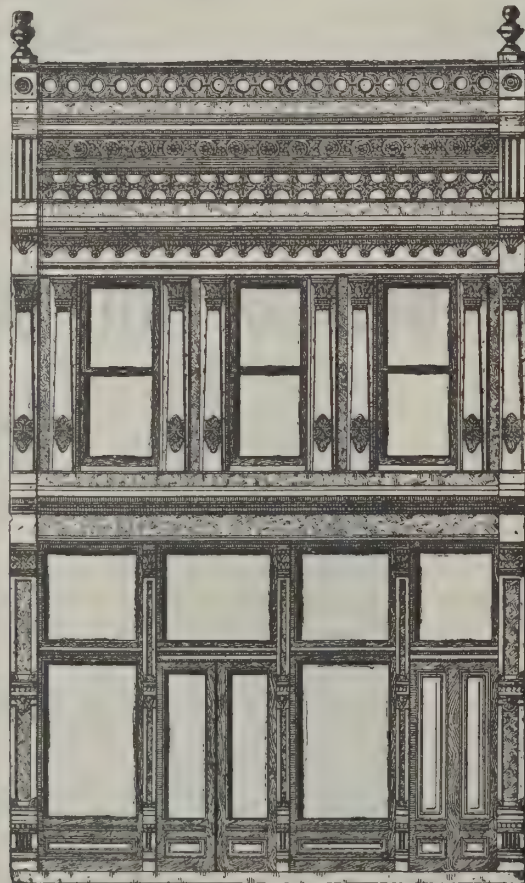
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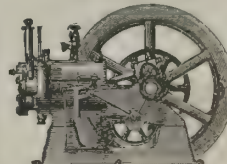
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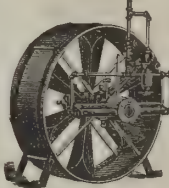
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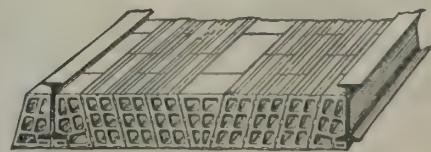
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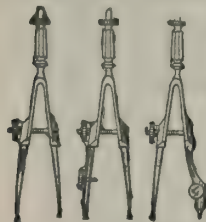
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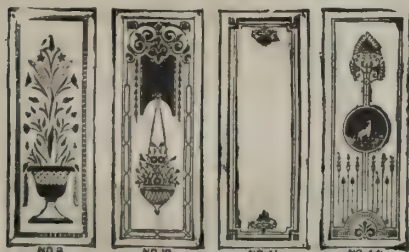
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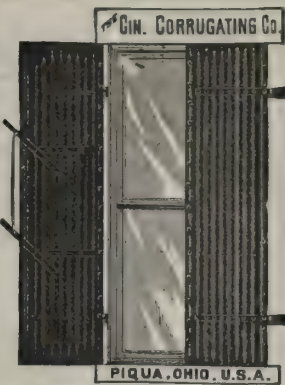
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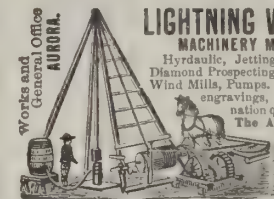
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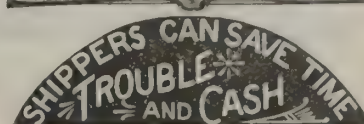
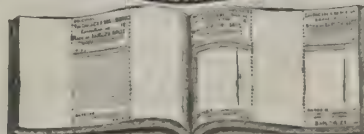
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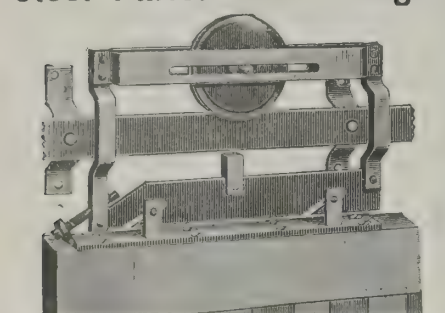
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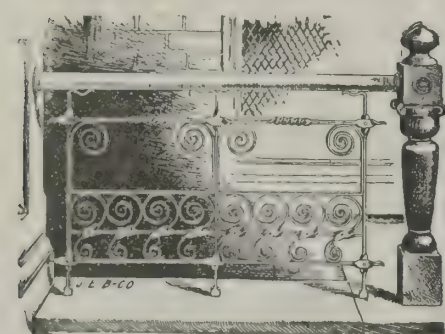
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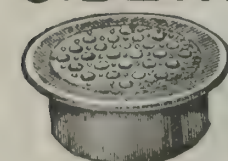


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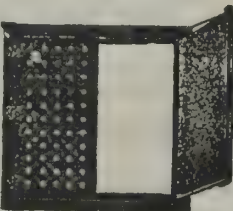
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(1) S. D. asks: 1. How can we purify natural gas so as to use it for lighting? It burns with a blue blaze with great heat, but does not give much light. A. Carbureting with gasoline will effect our purpose; no purifying is needed. Possibly passing through slaked lime would help it. 2. Will natural gas run a gas engine as well as coal gas? A. Not generally, and in your case certainly not. 3. Our gas well has a steady flow, but the gas will not burn at all times. What is the cause? A. Your gas evidently varies in composition. When it will not burn, it is because it contains probably too much nitrogen.

(2) S. E. B. asks: Can you give me a receipt for treating oak and giving it a 16th century finish? Also a receipt for treating iron, such as grates, fenders, etc., giving the same an old iron finish? A. Oak may be given the appearance of age by sponging with sulphuric acid and water equal parts, or, what is preferable, staining with umber in thin shellac varnish. Iron work may be treated with a wash of sulphate of soda and heating over a fire, or by brushing a solution of flour sulphur in 10 parts of turpentine, dissolved by heating, over the iron, then holding them over an alcohol lamp; heat until the black polish appears.

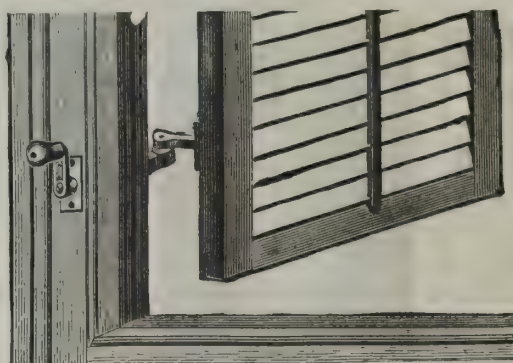
(3) F. D. S. says: I wish to use the power of a fall of 30 feet of water delivered through an iron pipe 2 feet in diameter and 70 feet long. a. What size turbine should I use? b. How much useful power would I obtain? c. What would be the rate of flow from the end? A. If you have a full supply at the head of your pipe, it will deliver over 8,000 cubic feet of water at the mouth per minute. If you are sure that you have this quantity of water supply, you may realize 225 horse power with a 48 inch turbine of good make, or equal to the Leffel wheels.

(4) M. S. S. asks how to make a furniture polish that will make a fine gloss and dry in the shortest possible time. A. Dissolve 4 ounces beeswax in 1 pint turpentine, color with alkanet root if desired. There are many other formulae; the above is given for its simplicity.

(5) J. C. P. asks for latest method of determining by simple process, suitable for high school laboratory, the presence of arsenic in wall papers, etc. A. By simply burning the garlic-like odor of arsenic can be detected if arsenic is present in large quantities. If chemically pure zinc and sulphuric acid are obtainable, Marsh's test is best. It is given in all analytical chemistries, such as Shepard's "Inorganic Chemistry," \$1.50.

(6) W. S. S. asks: Kindly give the weights for cord of granite, lime, and sandstone. A. No definite weight can be given. Each kind of stone varies in different localities. If you mean broken stone, an approximate answer only can be given—granite 2,700 pounds, limestone 2,600 pounds, sandstone 2,400 pounds per cord. These figures will vary from 100 to 200 pounds, according to locality and condition.
(Continued on page vi.)

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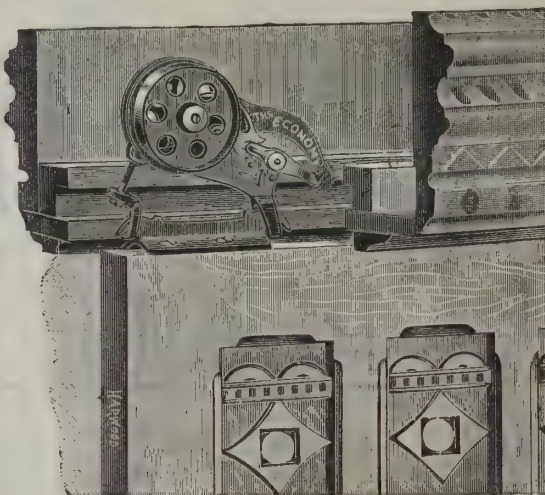
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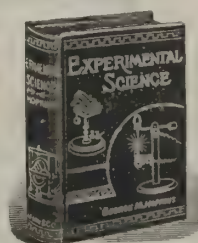
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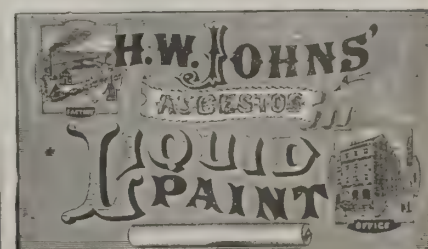
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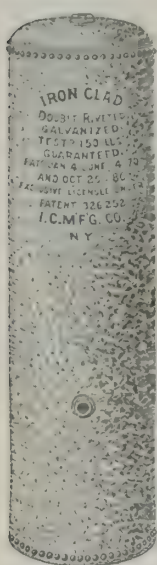
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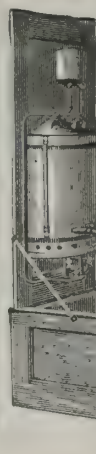


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(Continued from page iv.)

(7) F. M. O.—Portland cement one part,
clean white sand two parts, will make a light colored
mortar, for a sidewalk or other purpose.

(8) J. B. writes: I would ask for a
recipe to lacquer brass on doors. A. For lacquering
brass.—Make the surface perfectly clean of grease or
dirt. Lacquer with a thin solution of shellac in methy-
lic alcohol, color with dragon blood gum to suit taste,
and decant the clear lacquer. Use a camel's hair brush,
and if possible heat the articles to about the tempera-
ture of boiling water.

(9) C. F. K.—You will see articles on
artificial stone and its manufacture in SCIENTIFIC
AMERICAN SUPPLEMENT, Nos. 154, 325, and 355.

(10) C. T.—Reading an article in vol. 64,
No. 17, on "Water Power in Motion," an argument
arose as to whether there was any friction of water on
pipe. Suppose we have 100 feet head and 100 feet of
pipe, or 100 feet head and 400 feet of pipe, with the
same amount of water. From which could we obtain
the most power, or would it be the same? A. The
friction of water in pipe increases with the length with
given heads. The shorter pipe gives the most power.
See the "Power of Water, or Hydraulics Simplified,"
in SCIENTIFIC AMERICAN SUPPLEMENT, No. 788.

(11) J. B. asks: Does a lightning rod
attract lightning? "A" says it attracts first and then
conducts. "B" says it does not attract, but only con-
ducts? A. It is supposed that the main function of
a pointed lightning rod is to diffuse the earth's charge,
and thus prevent the violent union of the electricity of
the clouds and the earth. The rod when struck conducts
the charge to the earth.

(12) J. M. writes: Do you think from a
sanitary standpoint it would be proper to discharge the
sewage of a hotel into a dry well, twenty feet deep, the
bottom of which is loose, porous sand? The well will
be 300 feet from the building. And if there would be
any danger of contaminating the water of a spring 1,600
feet from the well and which runs from the base of a
hill opposite to the one on whose side the well will be
located? It is the intention to use disinfectants and
deodorizers in the well; and do you think quicklime
sufficient? A. From a sanitary standpoint it would
not be proper to discharge the sewage into the well.
The better way would be to make a tight cistern of ce-

(Continued on page vii.)

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Of all dimensions, worked,
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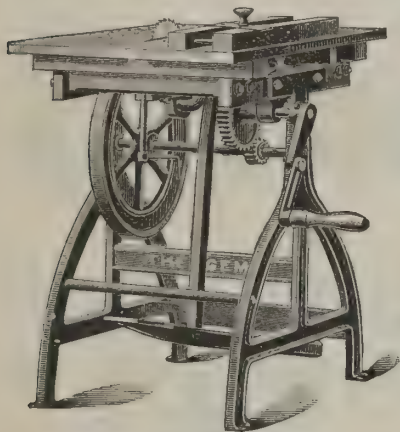
No publication has ever been produced in the Spanish language that begins to compare with *La America Científica* in the extent and variety of scientific contents or number of illustrations. It has the largest circulation in Spanish countries of any periodical of its class.

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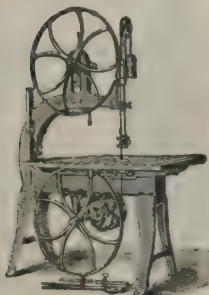
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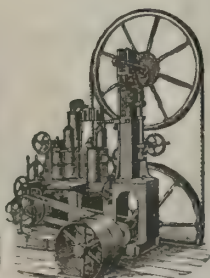
Full plans, specifications, and sheets of details, complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including churches, colleges, schools, stores, dwellings, carriage houses, barns, etc.

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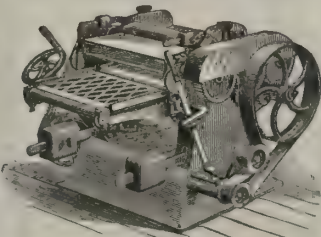
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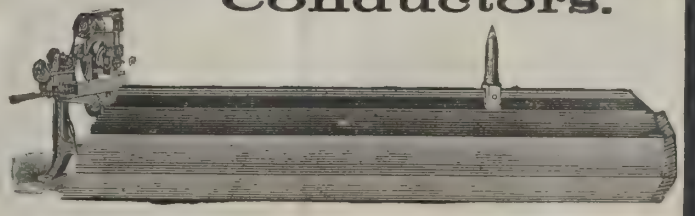
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NEW YORK.

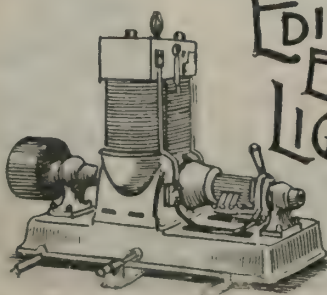


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Conductors.



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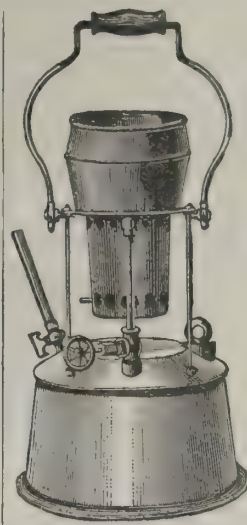


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WILL MELT TEN POUNDS OF SOLDER
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—MANUFACTURERS OF AND DEALERS IN—

Plumbers' Supplies.

FACTORY AND SHOWROOMS:

1136 Ridge Avenue, Philadelphia.

(Continued from page vi.)

ment in the ground to receive the sewage, the contents of the cistern to be periodically removed and spread on the ground at a distance from habitations. The well, if used a receiver of sewage as you propose, would be likely to contaminate the spring and other waters near or distant, below the level of the bottom of the well. Quicklime would be a poor disinfectant.

(13) E. B. asks for a cement or composition. Kindly favor with a cement and how to apply it to join a close grained, hard, white marble slab, 8 inches deep by 2 inches thick, 4 feet long, rough broken into two pieces about the middle of its length, forming a side piece for cradle of a grave, and being always exposed to the inclemency of the weather. A. You might try a cement formed of oxide of zinc mixed with a strong solution of chloride of zinc. It will have to be applied quickly to each half of the stone, and the pieces joined before the cement sets. It will probably be well to experiment on a small piece of stone before applying the cement to the marble.

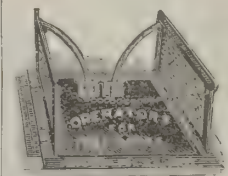
(14) T. W. J. asks (1) for directions for softening stone, so that it can be moulded into any desired shape, and again become hard as before. A. Stone cannot be softened as you describe. 2. What liquids (or chemicals) will produce the most intense heat? A. Sulphuric acid and water produce heat far above the boiling point. The acid should be added slowly to the water. There is always danger in doing it.

(15) T. L. P. writes: In my daughter's house, being built from plans furnished by your architectural bureau, the floors, which are of white oak, have become disfigured by black stains, probably where damp iron in some way has been in contact with them. I suppose it is tannate of iron. Can you suggest some means of removing this discoloration? A. Try hydrochloric acid diluted with ten volumes of water. If this is not strong enough, try weak solution of oxalic acid. The idea is to use any remedy as weak as possible.

(16) F. C. M. asks: 1. Which is the best material with which to construct a 6 foot sewer $\frac{1}{4}$ miles long, tunneled under a hill 200 feet from the surface, cement, concrete, or brick, and which is used the most? Cement is worth \$4 per barrel, here in Seattle, and sand and gravel in abundance. Sewer brick are worth \$10 per M delivered on the work. Which is considered by men of experience in that business to be the most practical, a cement or brick sewer? A. For a sewer of dimensions you state, brick set with cement mortar is best. 2. Can you refer me to any cities which have constructed cement sewers? A. New York, Brooklyn, and nearly all the large cities. If the tunnel you mention is to go through earth, the work might be easily executed by means of the Beach pneumatic shield.



CANNOT BE TIED OPEN.
BROUGHTON'S PATENT SELF-CLOSING
WHEEL HANDLE BASIN COCK.
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LIGHTS

Of Every Description.

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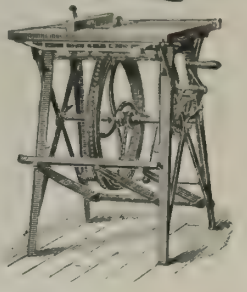
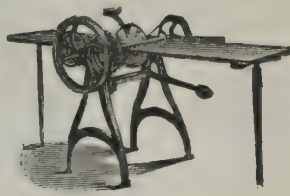
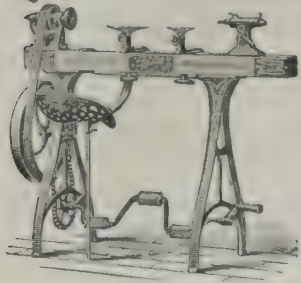


We were the first to bring out foot and hand power machines which were practical for workshop use, and are to-day the only house in the world making a complete line of such machines suited for the different requirements of the carpenter and builder. With an outfit of these machines the carpenter is placed in a position to compete on even terms with steam power machinery, and is thus able not only to hold his fair share of the business, but to extract therefrom a larger profit than would otherwise be possible. The complete outfit of the machines represented on this page, together with full assortments of knives, chisels, cutter heads and other accessories, would cost less than three hundred dollars. Suppose we figure the interest on the outlay at 10 per cent., or thirty dollars a year. Over and against this it is perfectly safe to say that a contractor, by reason of the advantages these machines give him, will more than save their cost every season. What better investment could be made? The purchaser can take the complete outfit, or only one or more machines, at a time, as his requirements may demand.

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Send for our Catalogue and Price List, which gives full descriptions of the different machines we make.

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The Adamant Plaster Mfg. Co.,
Tacoma, Wash.

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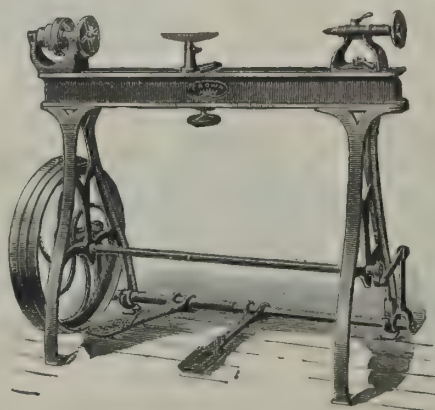
The Adamant Manufacturing Co.,
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One man can rip 600 feet per hour, 1 inch pine; Hardwood in proportion. Cuts up to 3 1/4 inches thick, works accurately, saves time, lumber and labor. Weight, 245 lbs.; boxed, 335 lbs.

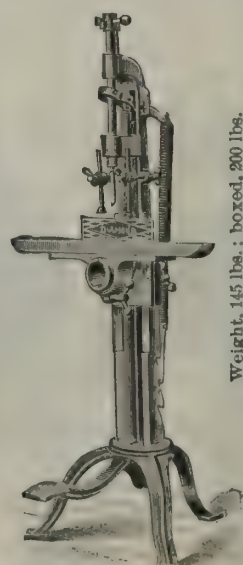
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city. Has two changes
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Saw. \$50.



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Is strong, substantial, and thoroughly built. Has Hollow Spindle, 3 speed cone for 1 1/4 in. belt, large Drive Wheel, and our Patent Foot Power, with a walking motion. Countershaft furnished in place of Foot Power, when so desired, without extra charge. Price, No. 1, Swings 8x24 inches, \$30. No. 2, " 10x36 " 40.



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Will mortise 1/4 to 1 inch wide, 3 in. deep, and with the addition of the Tenoning Tool, cut Tenons 1/4 to 3/4 in. thick, 3 in. wide. PRICE, with 3 Chisels, \$25.

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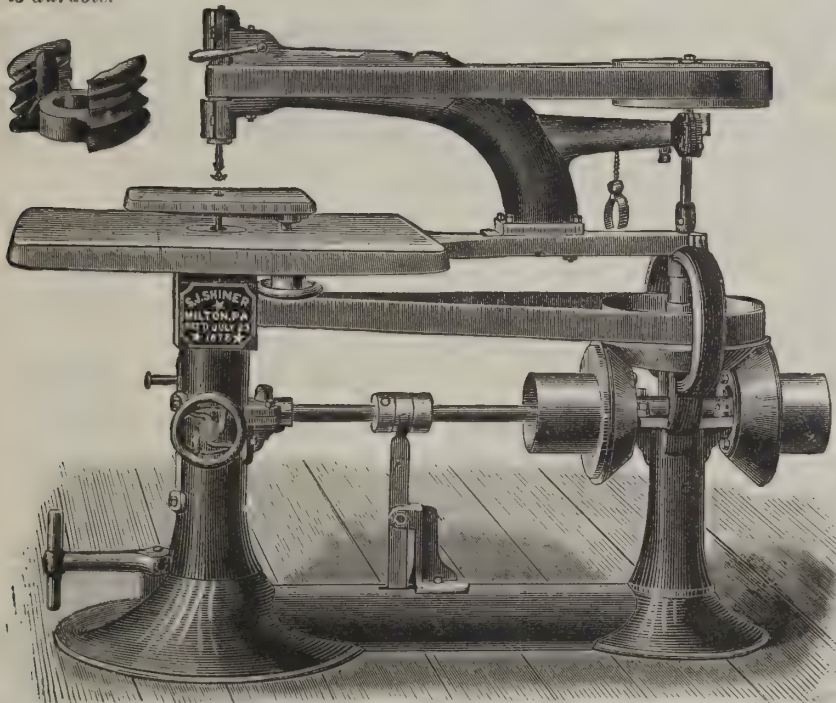
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Silver Medal on Tools Awarded by Amer. Inst. 1886. Medal "Superiority" for
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Shimer's Variety Moulder, with Surface Moulding Attachment.

FOR SINKING panels with pattern guided by pin that automatically takes its position when you start the Machine, and drops out of the way when you stop it. The Cutter in the overhanging arm of the Machine has a perpendicular adjustment of one inch, and is operated by the handle shown in the cut attached to an eccentric lever that is automatically locked to the one position when at work.

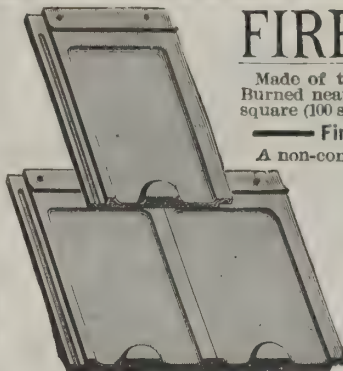
TO CHANGE from Surface Moulder to Variety Moulder, disconnect the rod that runs the incline on the T lever and pin it up. Run the housing up by means of the hand wheel until it stands above the belt line, remove the one spindle, substitute the other and set screw it to the housing. Turn the small table back under the arm. Raise the arm, disconnect the shaft that runs the upper pulley, and the Machine becomes an Edge Moulder without having any of its parts unbolted and laid away.

You never tire of the make-up of this Machine, which is as simple and effective as it is durable.



Reversible Cutters for any shape of mould made to order, and warranted to cut free and easy. For Circulars and full information, address,

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A non-conductor, therefore cool in summer.

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LYLES & MILLS,
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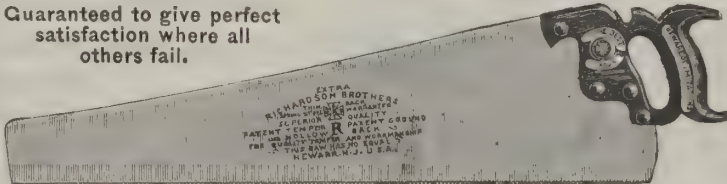
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The Richardson Brothers are Thoroughly Practical Saw Makers.

The RICHARDSON Saws will be sent, Express Paid, direct from the Factory, when they cannot be procured from the Hardware Dealer. Special saws made to order. Send for Illustrated Price List to

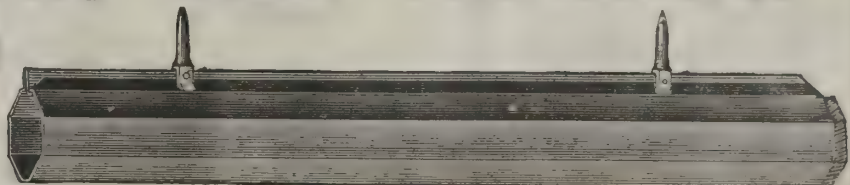
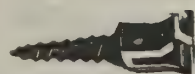
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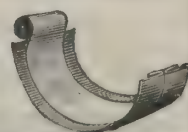


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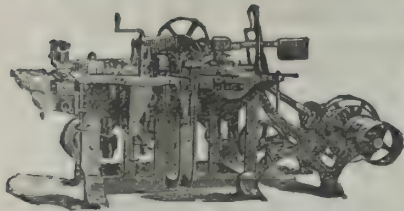
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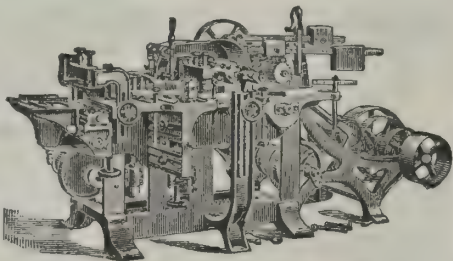


7-inch Four-Side Moulder.

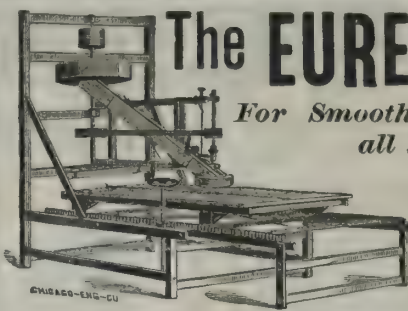
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INDIANA MACHINE WORKS,
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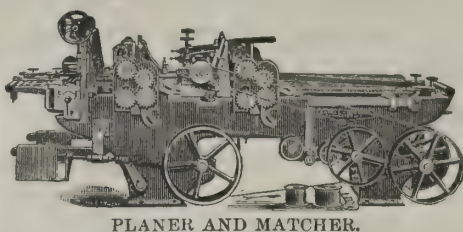
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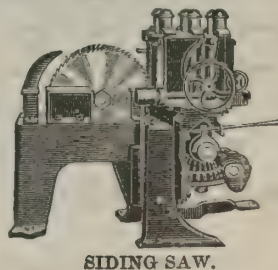
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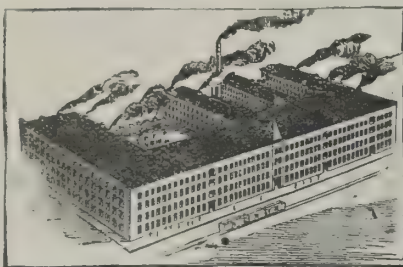
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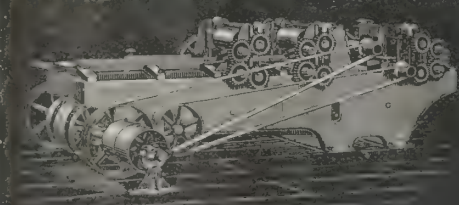
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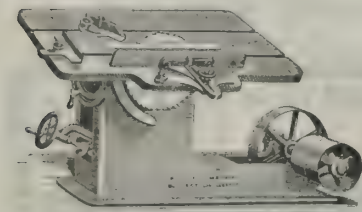
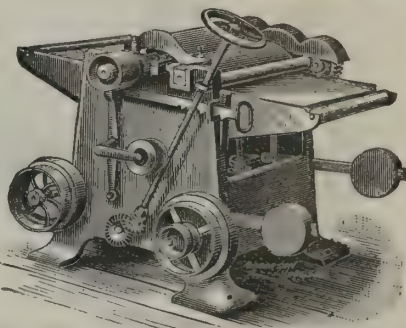
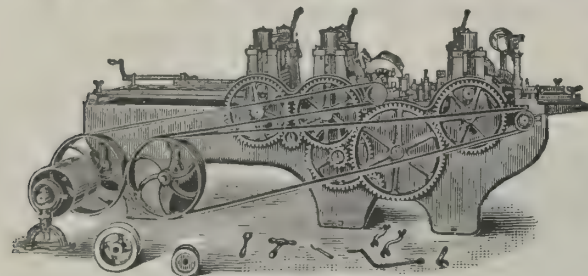
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Wood - Working - Machinery.



No. 2

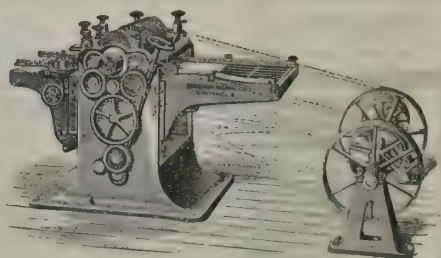
Dimension Saw with Tilt-
ing Table.

Cordeman

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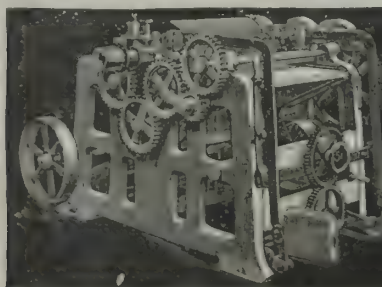
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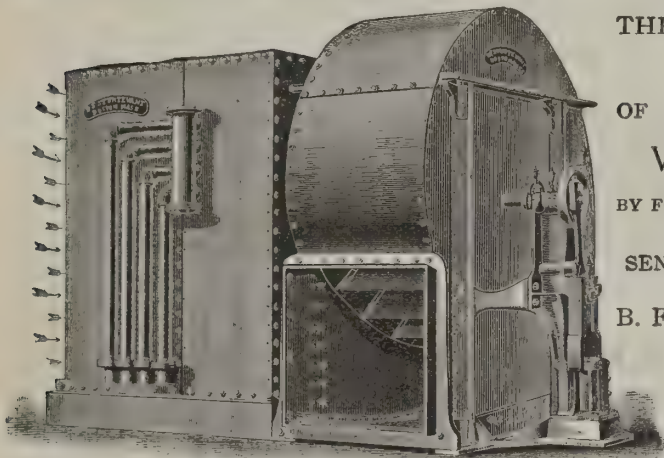
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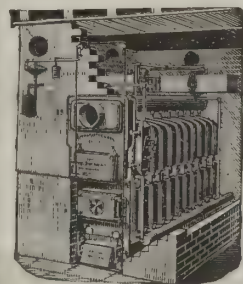
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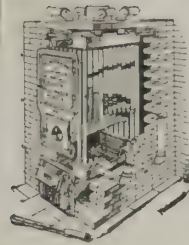
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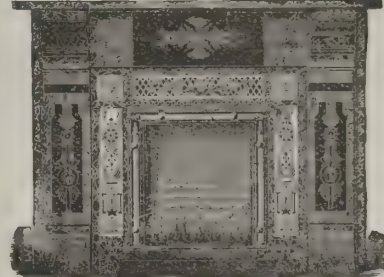
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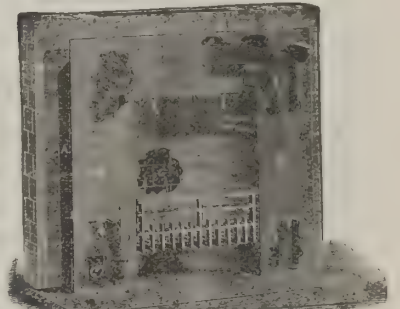
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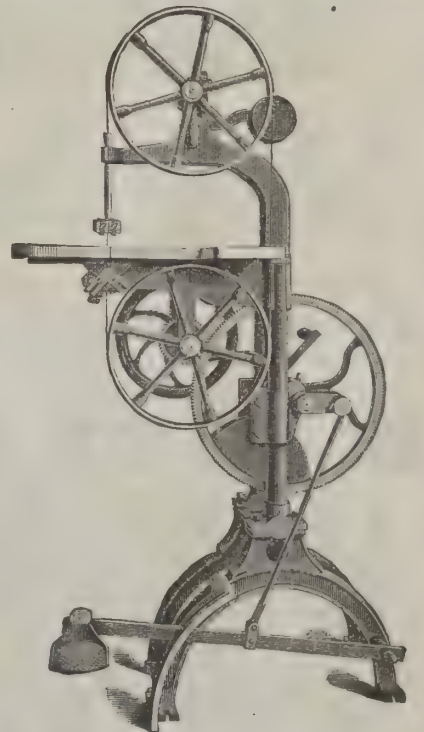


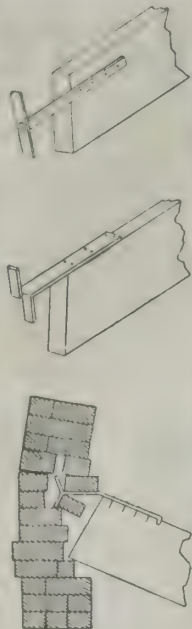
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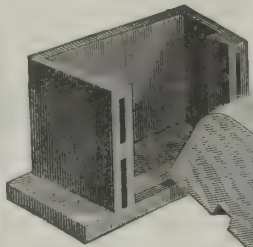
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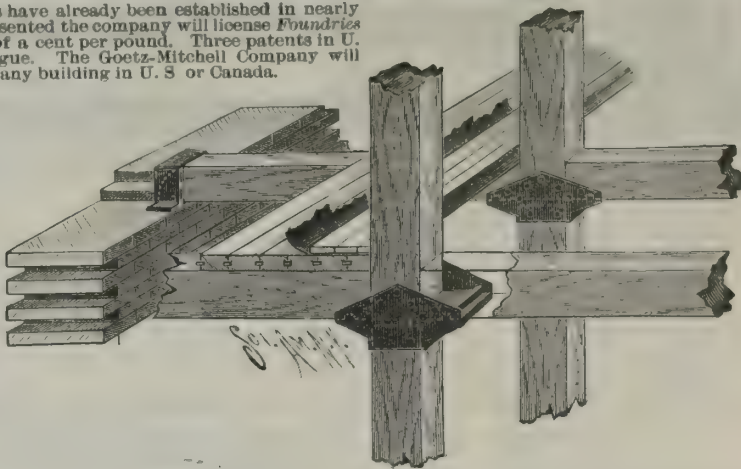
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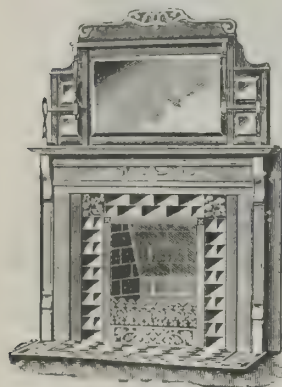
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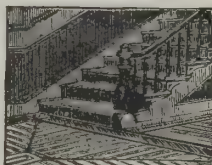
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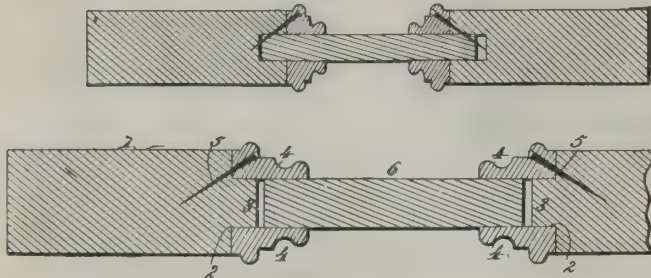
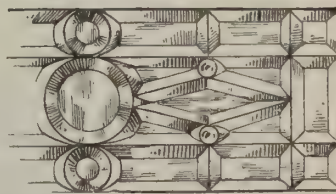
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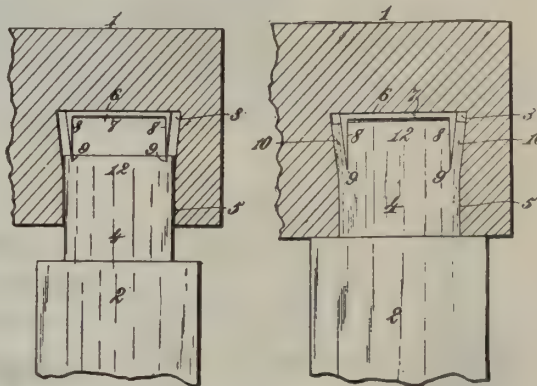
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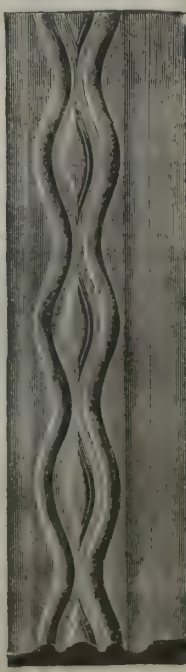
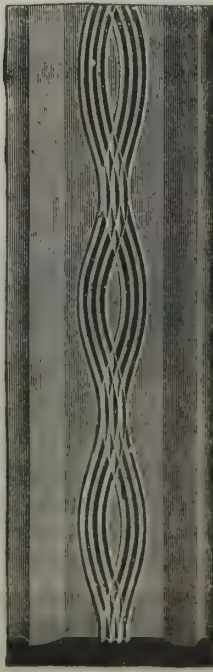
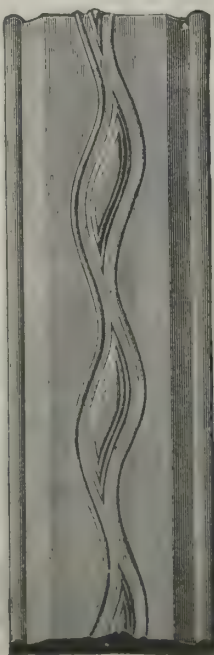
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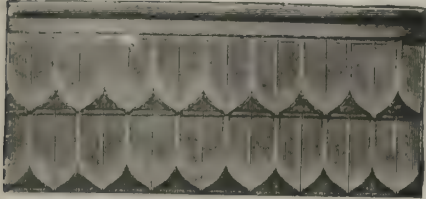
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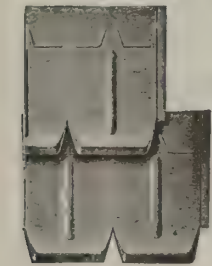
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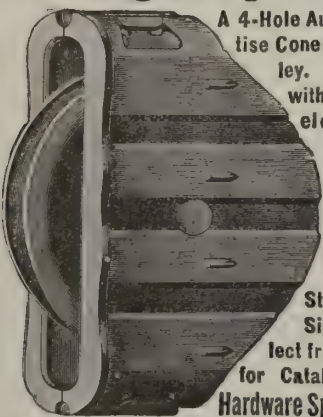
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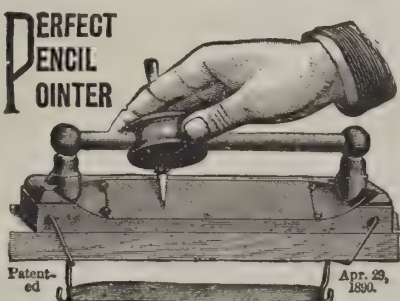
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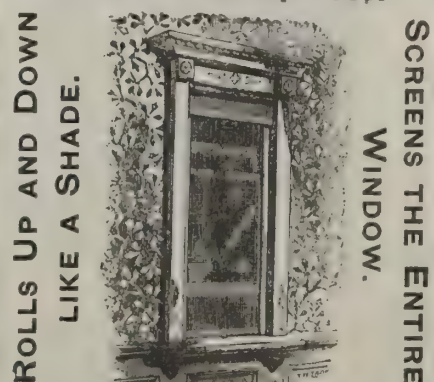
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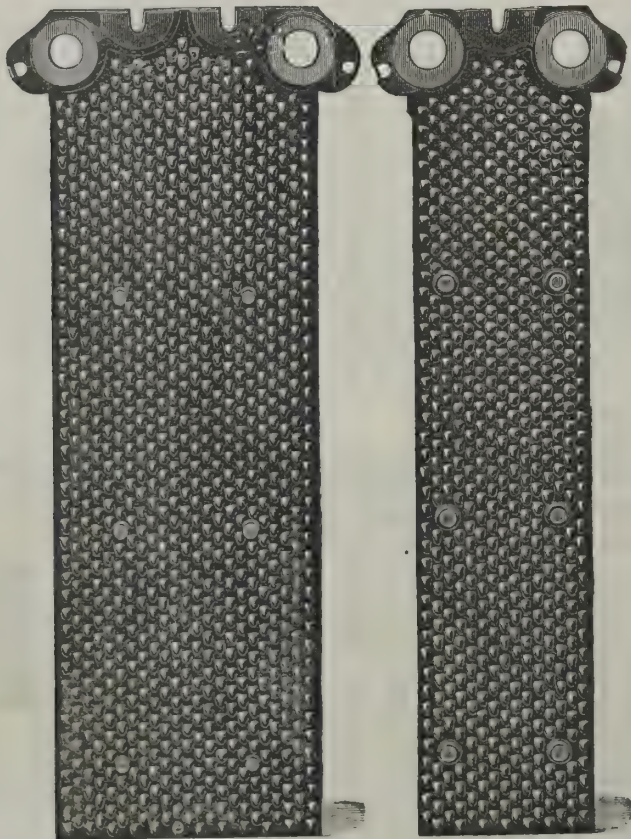
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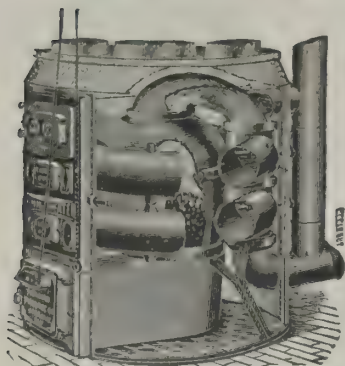
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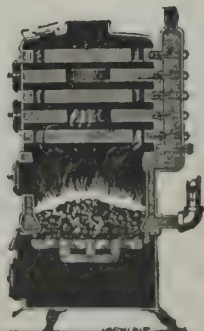
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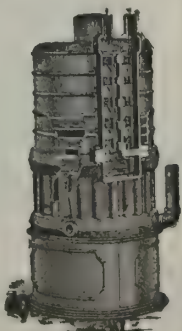
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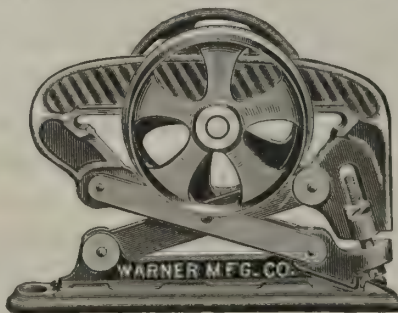
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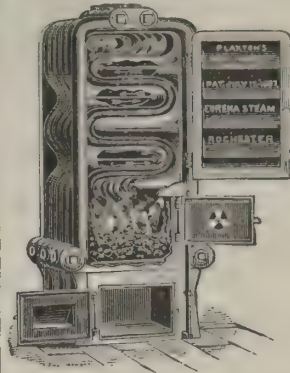
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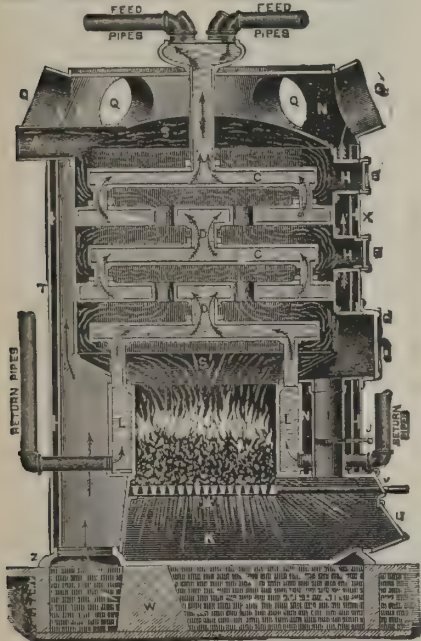
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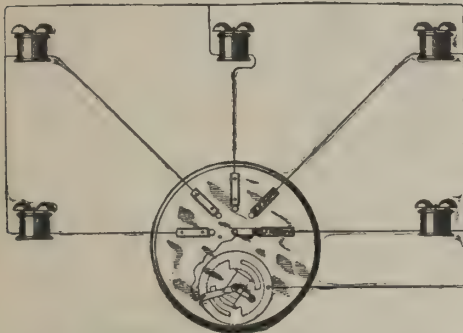
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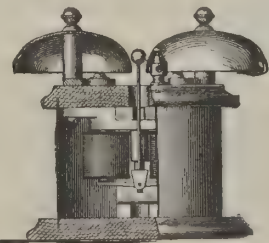


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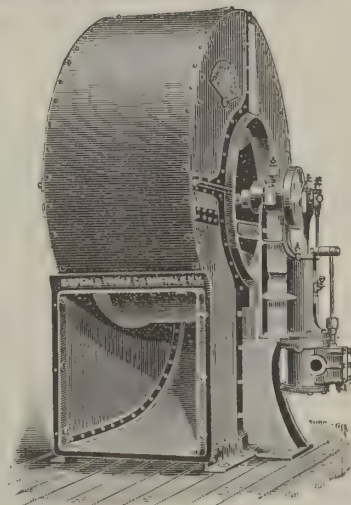
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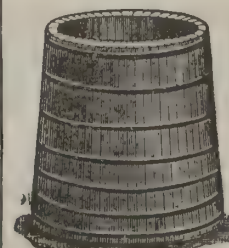
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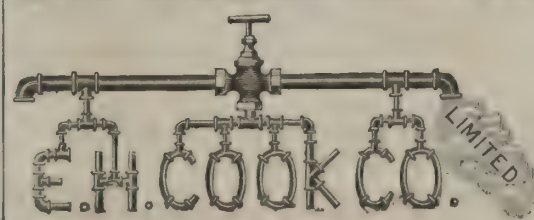
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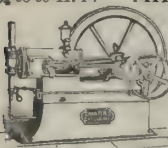
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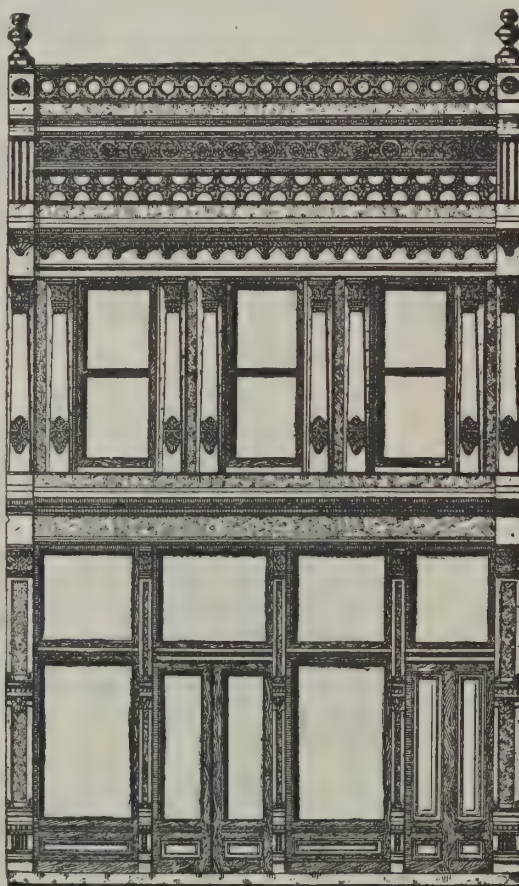
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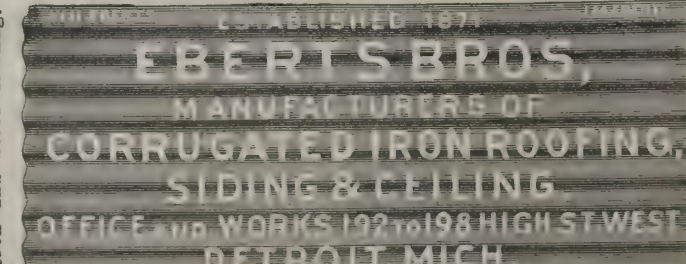
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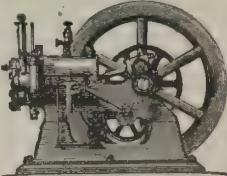
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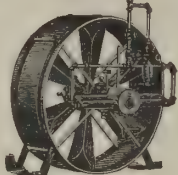
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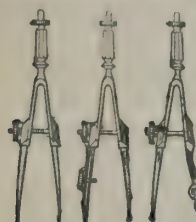
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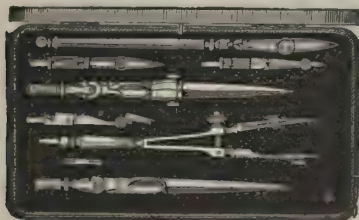
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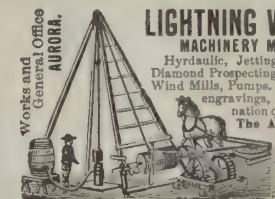
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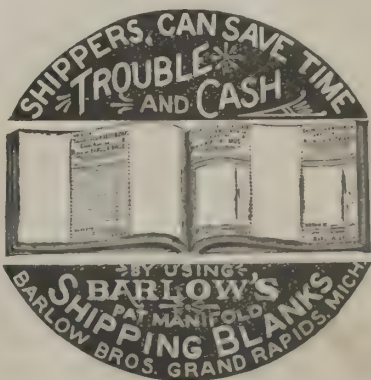
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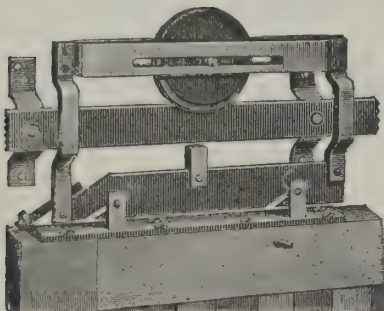
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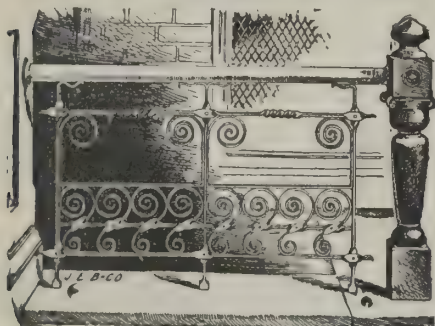
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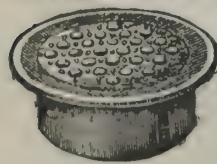


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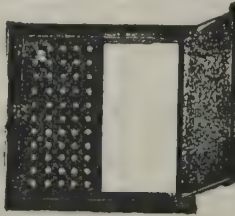
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Notes and Queries.

(1) F. W. M. asks for the best preservative preparation to use on a Spanish cedar skiff to retain its natural grain and color. A. Raw linseed oil, to be followed after drying by a thin flowing coat of spar varnish. Do the varnishing on a hot day.

(2) J. R. G. says: Please give directions for making cement walks, also asphalt walks. Will the cement for sidewalks be suitable for cellars? A. For cement walks use one part best Rosendale cement and two parts clean sharp sand. Make a stiff mortar, mix thoroughly, spread three inches thick. Excellent for cellars. Asphalt requires heat.

(3) F. & L. asks for some information in regard to staining cigar box lumber. A. Cigar box lumber is prepared by veneering. Whitewood is often used as the basis, veneered with Spanish cedar. On soaking a piece in water, the thin layer will come off.

(4) G. L. asks: Will you please tell me the best way to get rid of worms? We have a beautiful lawn for tennis, but the worms make it almost impossible for us to keep it in good shape. I was advised to try lime, and to put it on when the worms are out at night. We have tried it, and I am sorry to say not very successfully, as it does not kill them unless they get a great dose. It occurred to me that you may be able to tell me what will do it and not kill the grass. A. Reply by Prof. C. V. Riley.—Your ascribing the injury to worms which you say are out at night would seem to indicate that the depredators are the common earth worms or angle worms. Grass lands, however, are frequently injured by the larvæ of May beetles, though these do not ordinarily leave the soil. One remedy for angle worms and also for white grubs is to thoroughly wet the ground with the kerosene emulsion, the formula for the preparation of which has been published in the SCIENTIFIC AMERICAN. A few years ago very successful experiments were conducted with this emulsion on the lawns of the Capitol grounds, and an account of the results is given in the periodical bulletin of the Division of Entomology, *Insect Life*, vol. 1, No. 2. This report will give you the necessary details for the application of the emulsion. The larvæ of May beetles feed on the roots of grasses, and are very injurious to lawns. The earth worms, on the contrary, feed on the earth and the vegetable humus in the soil, and are constantly carrying the soil, through their excrements, from the lower layers to the surface, and as has been shown by Darwin, they are by this means of positive advantage to lawns under certain circumstances. When, however, they interfere with any special object, as in your case, they must be considered harmful, but beyond the use of lime and kerosene emulsion, as here indicated, I do not know any way of getting rid of them. Heavy rolling will doubtless tend to neutralize their effects, and large numbers of them may be captured at night by means of lanterns, especially after a good

(Continued on page vi.)

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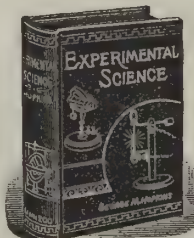
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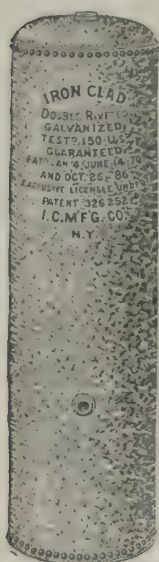
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(Continued from page iv.)

rain. They come out of their burrows, under such cir-
cumstances, and may be killed in large numbers by
any one who is at all quick and active.

(5) W. R. B. says: 1. We have two large
boilers here, and have had considerable trouble with
them, on account of the alkali forming a scale around
the flues, keeping the water away from the iron and
causing them to burn out. There are several prepara-
tions recommended for cleansing boilers, among them
Lord's compound, but the officer in charge here does
not like to use them for fear of injuring the boiler. Is
there anything of the kind that will do the work with-
out injuring the boiler? 2. Are there any numbers of
your Building Edition that have any information or
plans of a bowling alley? If so, please give me the
numbers, and I will send for them at once. A. Alkali
incrustations are soluble in water. By blowing off often
your boiler should have no incrustation. We think
that possibly it is carbonate or sulphate of lime that
forms the incrustation. You may remove this by dos-
ing the boiler with a half pound of caustic soda or
potash dissolved and pumped into the boiler once every
two weeks; then blow down three cocks of water each
day for three days, and afterward thoroughly clean out
the boilers. By its effect you will know how much less
soda or potash you can use at stated periods. This
treatment will not injure the boiler. Lord's compound
will not injure the boilers. Have no plan of bowling
alley.

(6) C. W. N. writes: Please state
whether, in your opinion, lightning rods on a building
are a benefit or detriment, with reason why. A. Pro-
perly constructed lightning rods are undoubtedly a pro-
tection. Such a rod not only receives the discharge and
conducts it to the ground, but it also tends to prevent a
disruptive discharge by diffusing the earth's charge
into the air.

(7) A. B. asks: 1. How can I test well
water for injurious matter, animal or vegetable? A.
Chemical and bacterial analysis is the best way of do-
ing this, and even such analyses are not of absolutely
certain interpretation. One simple method for a home
test is to drop some sugar into the sample and leave it
undisturbed. If it remains clear it is assumed to be of
good quality, otherwise, not. 2. What books can I get
on that subject? A. We can supply you with Wank-

(Continued on page vii.)

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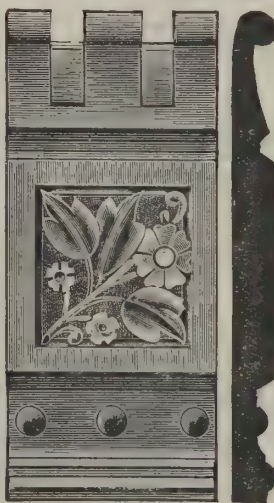
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(Continued from page vi.)

lyn's "Water Analysis," price \$2; "Examination of Water for Sanitary and Technical Purposes," by Leffmann & Beam, \$1.50 by mail post paid.

(8) L. M. T. says: Would you kindly inform a constant reader how to successfully kiln dry oak lumber and not have it warp? We use 12 feet even length best quality Wisconsin red oak. In piling we have six sticks even thickness 2 feet apart, foundations of piles perfectly level, but the lumber is not straight. With exhaust in day we have 130 degrees, live steam at night 160 to 180 degrees of heat. Sometimes in the middle of drying we allow the kiln to cool down entirely, for instance, stopping Saturday night, and not starting it again till Monday morning. Does that affect it? Is an even temperature necessary? What is the right temperature for drying red oak when hot air is not used? How is lumber dried with hot air? What degree of heat and what size of blower? How can I figure the pressure of force of any sized blower? A. Try turning steam into the drying room at the same time it is turned upon the coils. Keep the room moist in this way until the lumber gets heated to 130° or 150°. Then shut off steam from the room and continue the heat with very little ventilation. This will dry the lumber evenly and make it less liable to warp. It is better to have an even heat, and the drying should be finished within the week. It is better for drying oak to heat to 200° if possible. This you can do with live steam by closing drying room nearly tight during the last of the process. Ventilating blowers give about 2 ounces pressure per square inch. The pressure depends upon the speed. Address Buffalo Forge Company, Buffalo, N. Y., for their blower circular, which gives size, velocity, and pressure, and also in regard to forced hot air drying.

(9) Amateur Stone Cutter asks for a method of polishing Vermont marble. I have a small monument cut out of it, rubbed down ready for polishing, and I can't go any further, as I don't know what is used for polishing or how to use it. Also, in rubbing down face to a fine surface it shows an open seam 3 inches or 4 inches long. Would like to know if there is any preparation used by polishers to fill small cracks before polishing, and what it is? A. After rubbing the marble down with fine sand, use pumice stone, either powdered and applied with a felt rubber or in its natural state in the form of a lump with a plane surface. After smoothing with pumice stone, polish with putty powder and water. The cracks may be filled with Portland cement mixed with marble dust, or with a cement formed of oxychloride of zinc. This cement is made by mixing oxide of zinc with a strong solution of chloride of zinc. It is applied in the same manner as putty. You can tint the cement by adding to it while mixing it any of the dry pigments used in painting.



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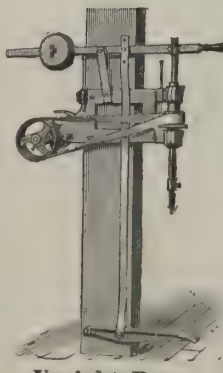
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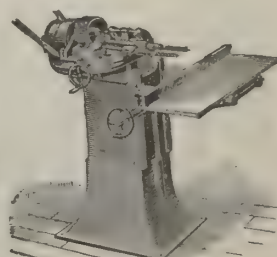
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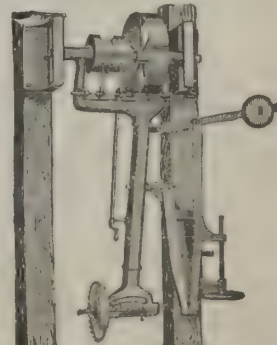
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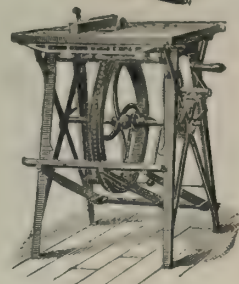
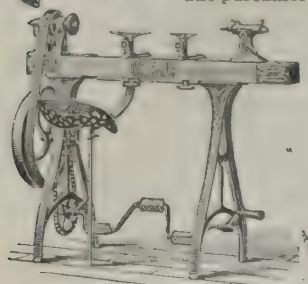


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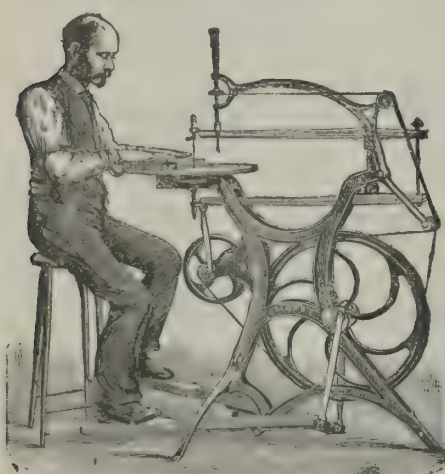
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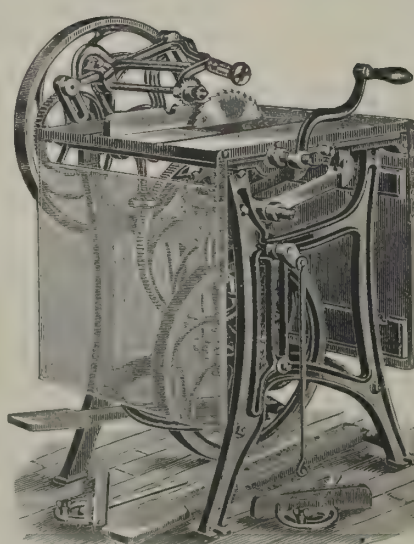
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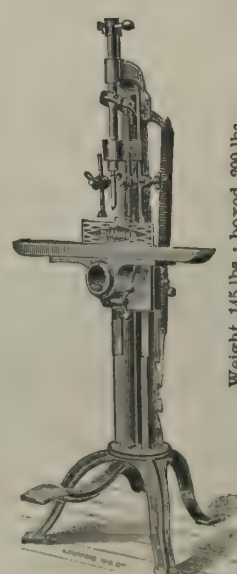
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Has Iron Table, Steel Shafts, Cut Gears, etc. No. 1 has four changes of speed, three changes of feed, extension table, etc. Can be easily and quickly changed from a Self-Feed Ripping to a Cutting-off Machine. Weight, 410 lbs.; boxed, 535 lbs.

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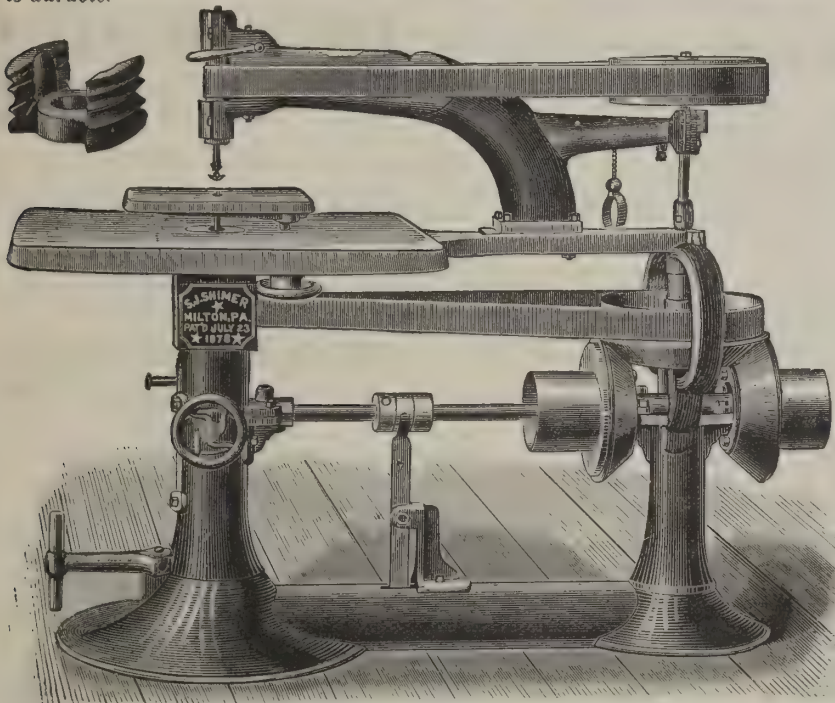
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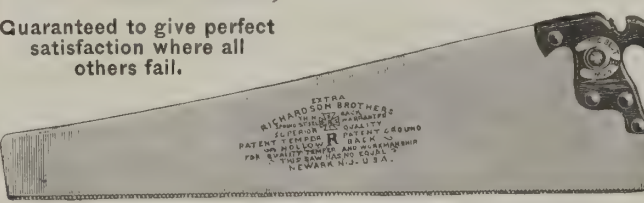
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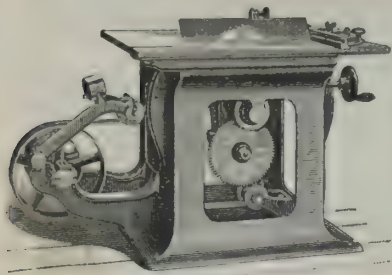
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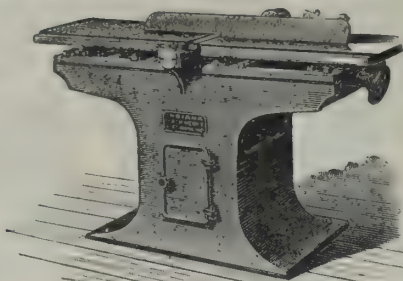


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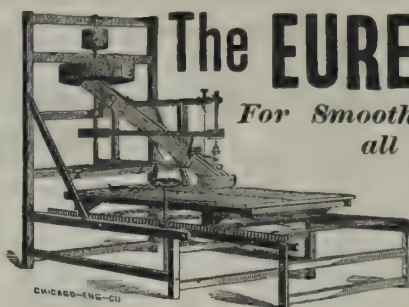
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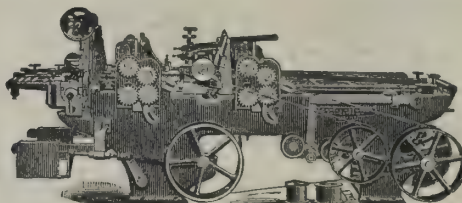
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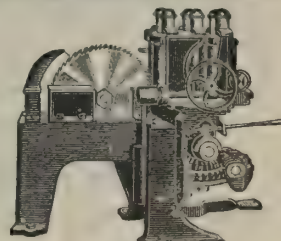
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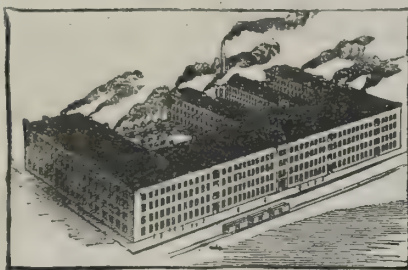
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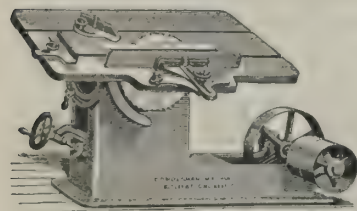
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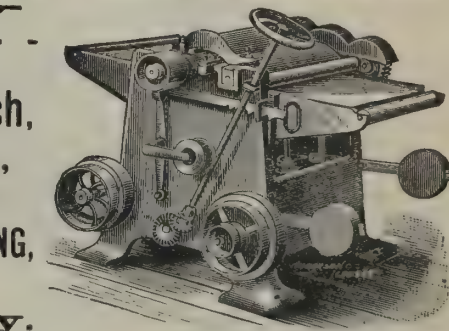
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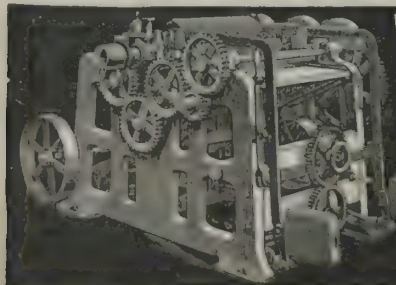
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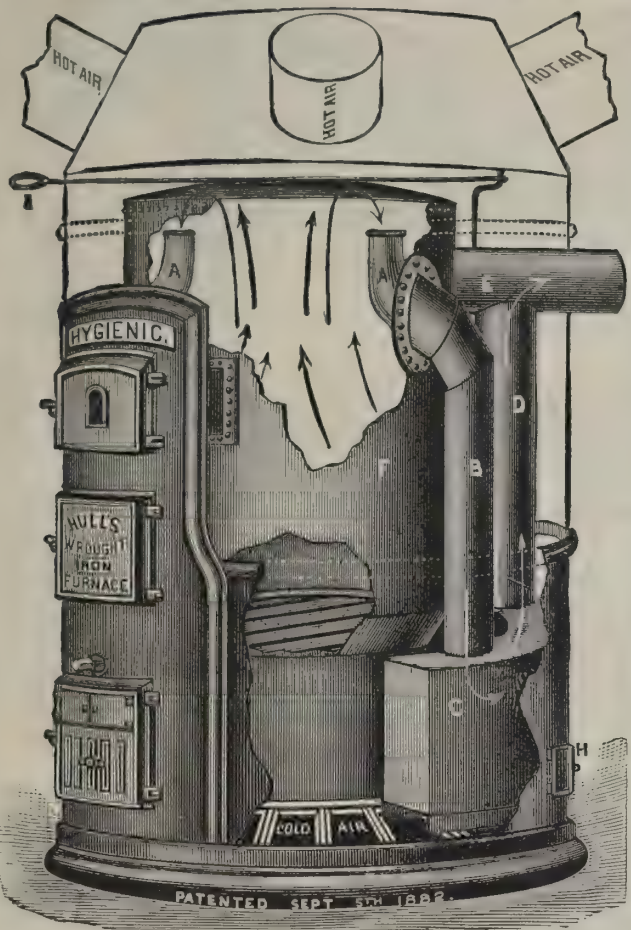
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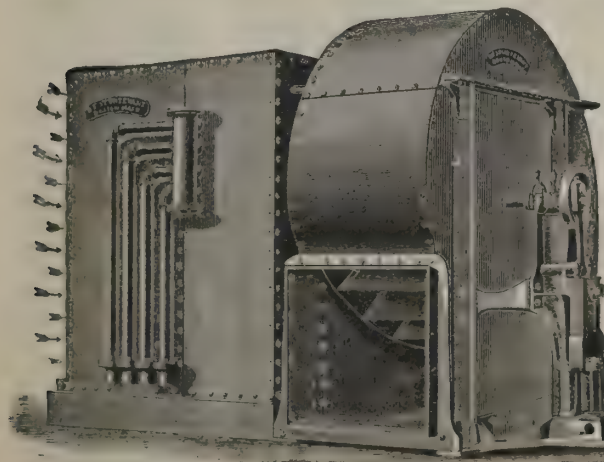
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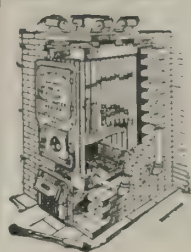


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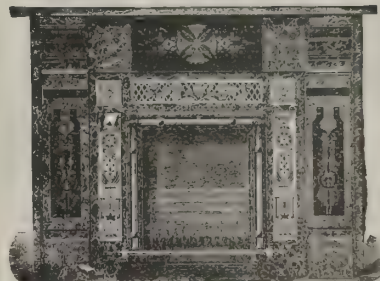
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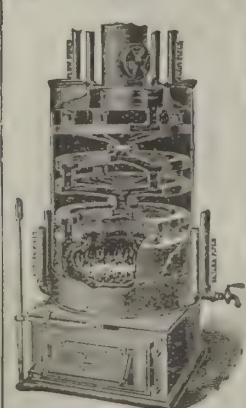
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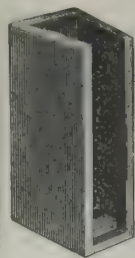
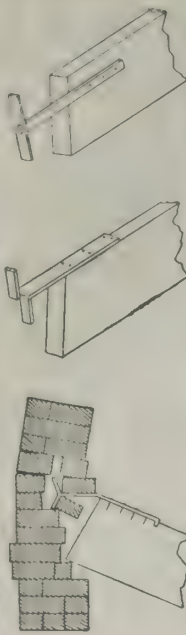
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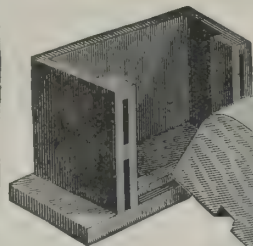
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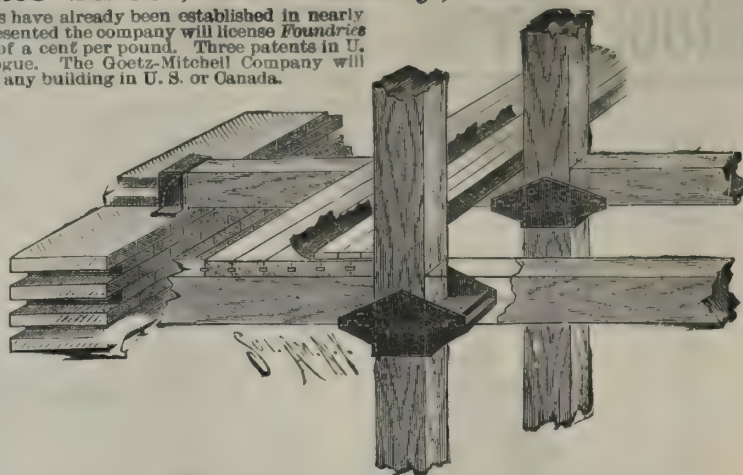
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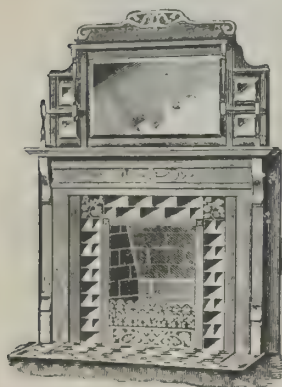
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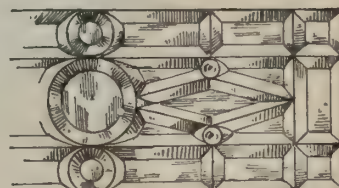
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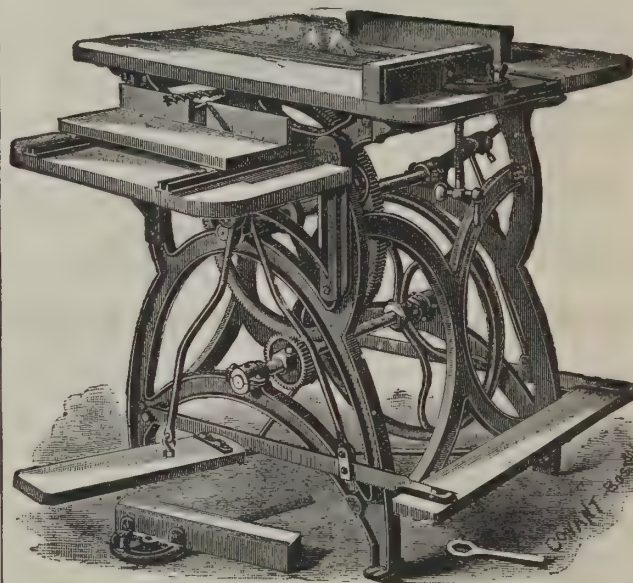
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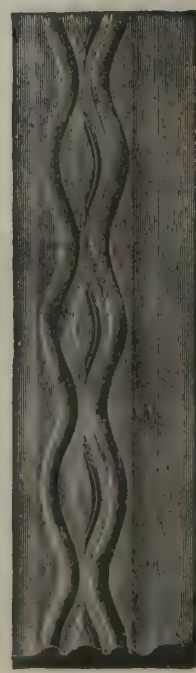
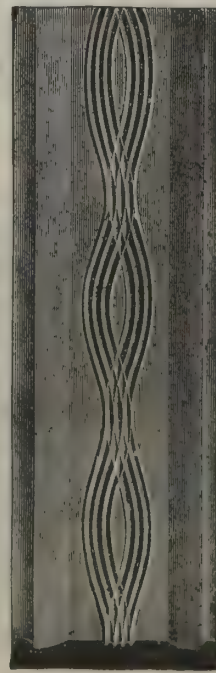
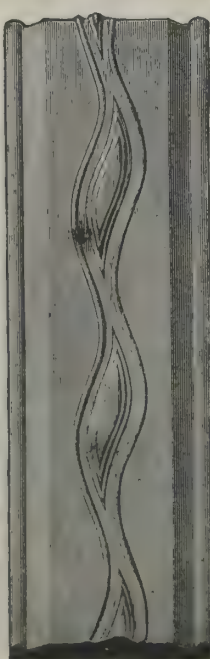
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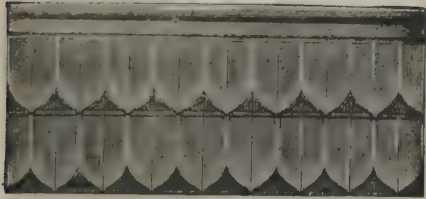
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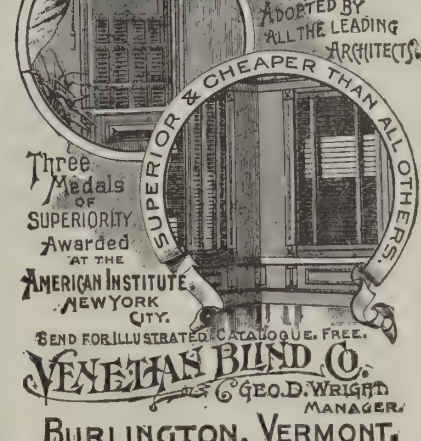
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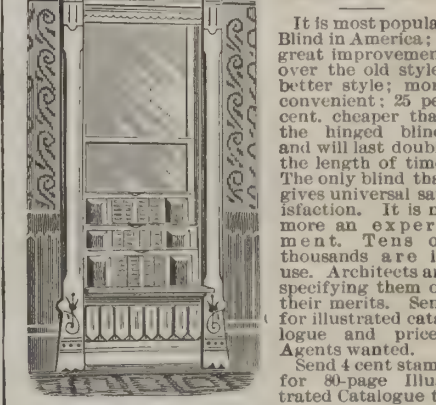
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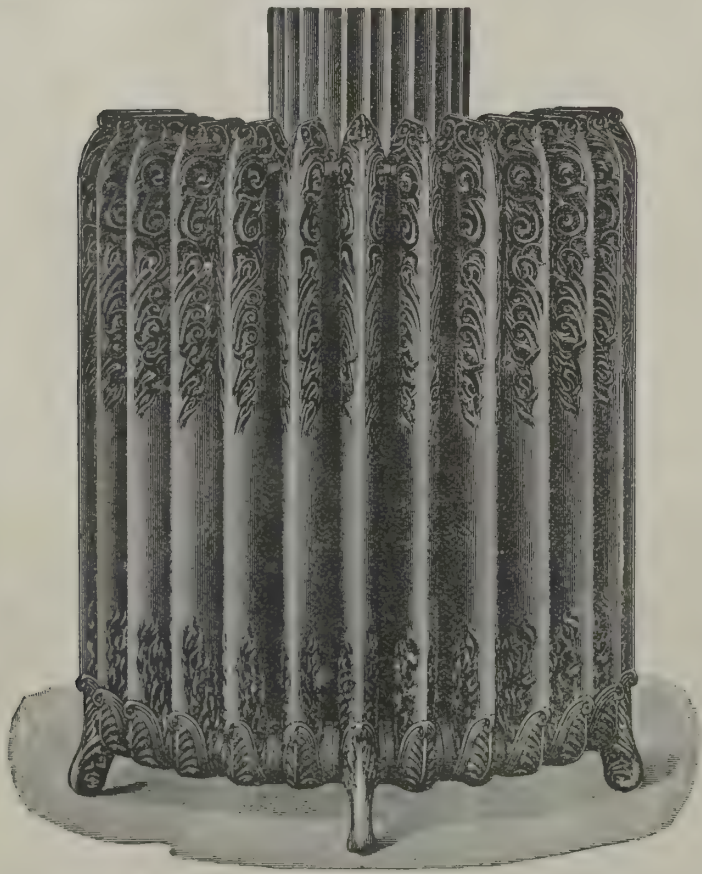
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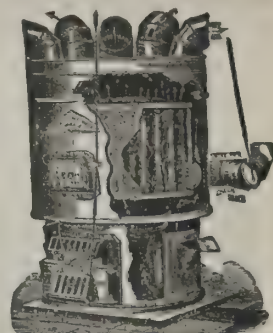
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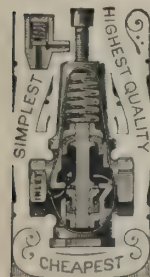
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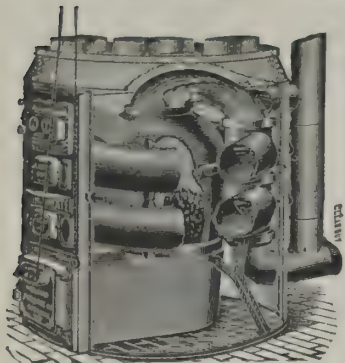
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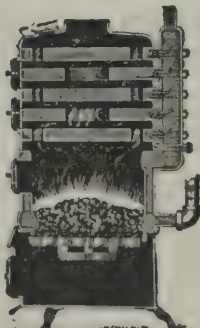
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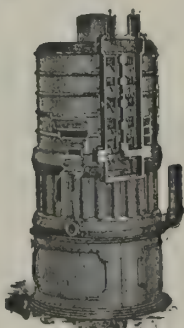
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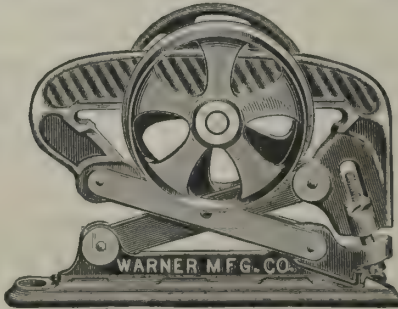


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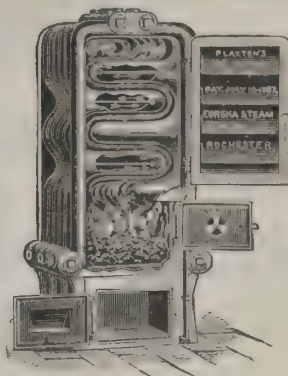
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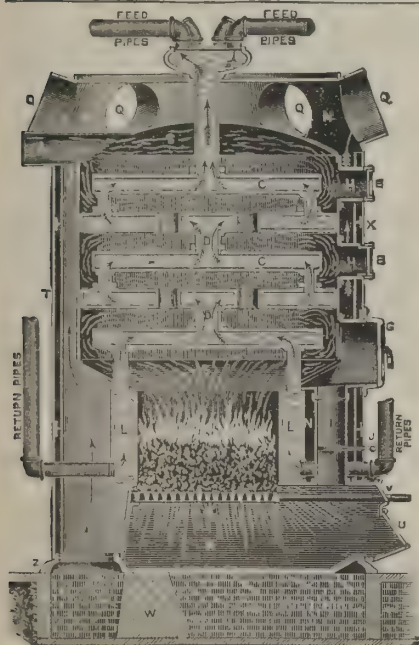
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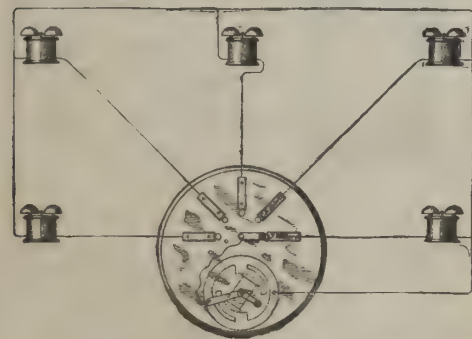
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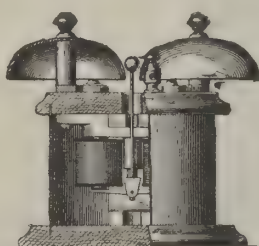
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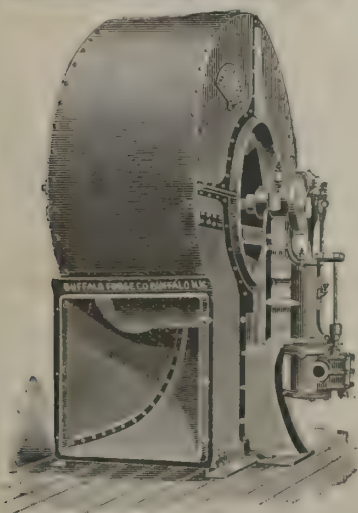
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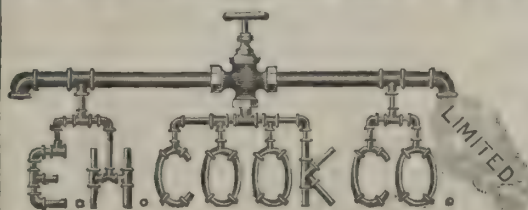
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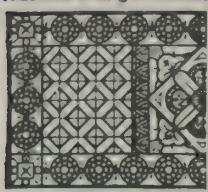
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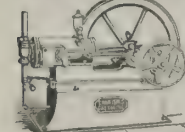
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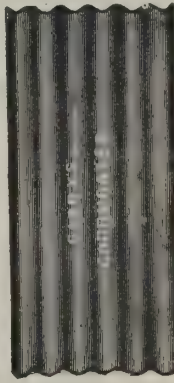
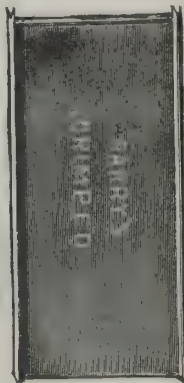
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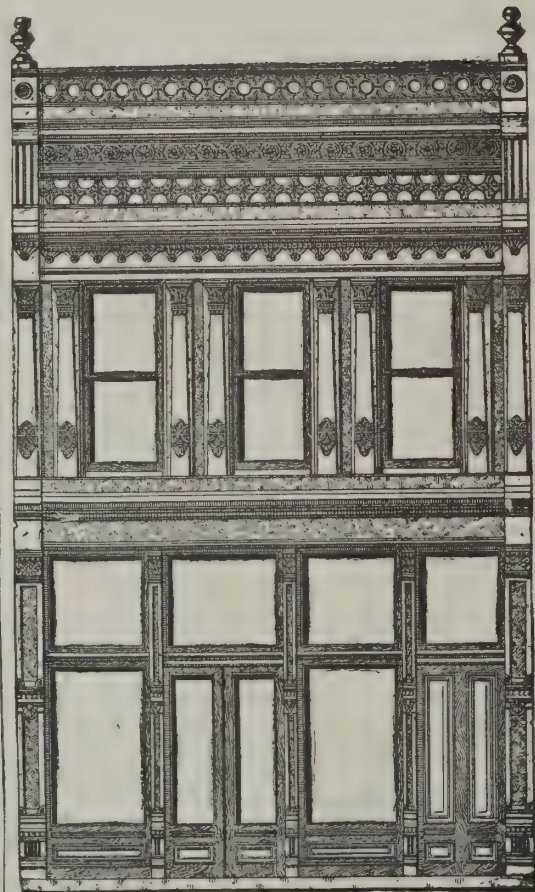
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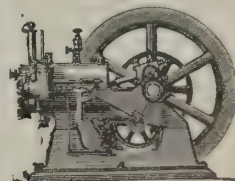
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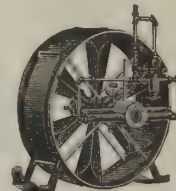
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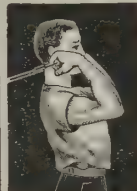
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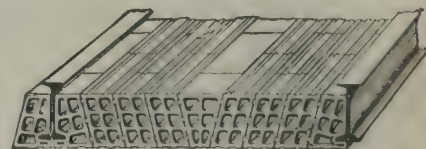
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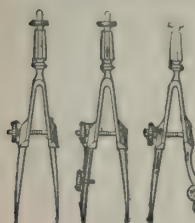
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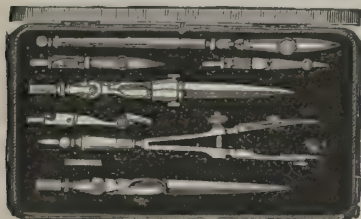
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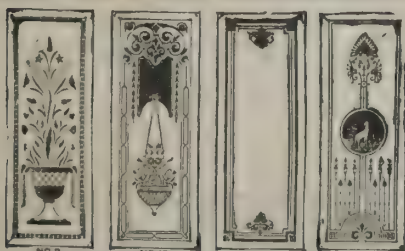
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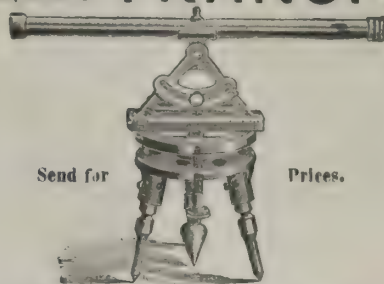


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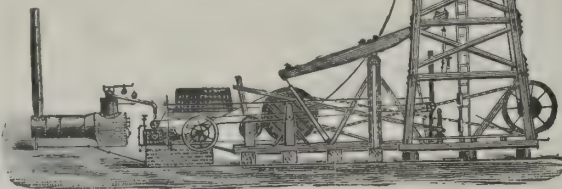
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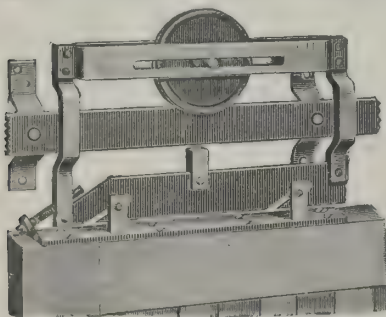
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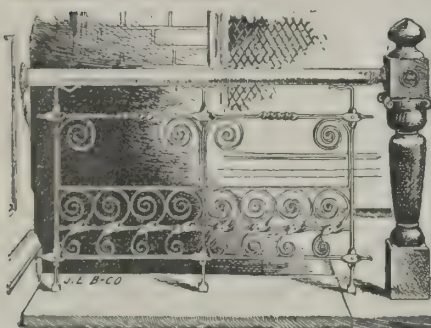


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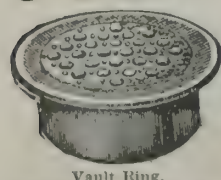


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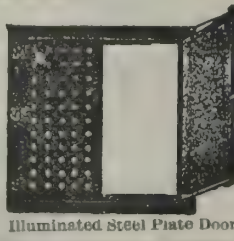
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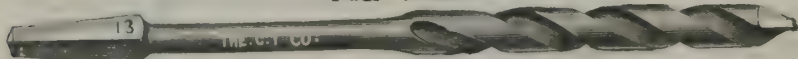
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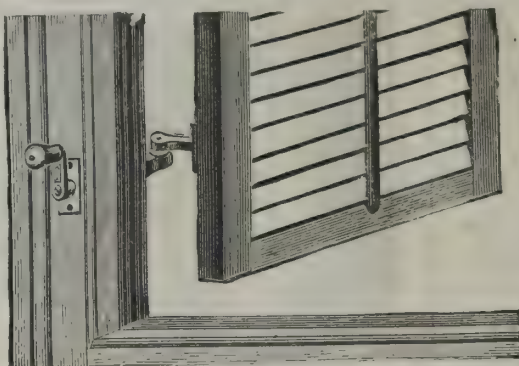
(1) W. M. asks how to prepare linseed oil to give it a heavy body that will endure, for oiling houses on which the paint is dull. A. Simmer, with frequent stirring, 1 gallon linseed oil with $\frac{3}{4}$ pound powdered litharge until a skin begins to form, then remove the scum, and when it has become cold and has settled, decant the clear portions.

(2) I. S. A. writes: 1. My cistern sprang a leak and I put about a peck of bran in to stop it. Now the water has spoiled, it smells bad and is harder than before. What is the matter, and can it be purified and how? A. Pump it out, clean it, and stop the leaks with cement. The bran we presume has fermented and occasioned the trouble. 2. Can glass be cast perfect enough to make an air-tight joint without any grinding after casting? A. No.

(3) E. W. R. writes: Have you any receipt for killing a small fly insect or borer which works in oak lumber, both in piles and in buildings, where there is not much to disturb them? This fly is very small, light brown in color, and between one sixty-fourth and one thirty-sixth of an inch in diameter and one-eighth of an inch long. It bores very rapidly, and works in our oak flooring, posts and girders, and in the board floors of our warehouse, where there is not much walking and going to disturb them. They will not work in the floor where we are running trucks or walking through it. We have written to a large number of lumbermen, but they know of nothing absolutely practicable for destroying the insects. A great many had heard of them, but had had no experience with them. We have saturated the lumber with strong solutions of salt brine, both hot and cold, and have also limed the posts and girders. It may be that we kill off a great many of the living insects, but if so, we do not kill the eggs, and the insect seems to increase with remarkable rapidity. A. Reply by Prof. C. V. Riley.—The small fly insect or borer which works in oak lumber, as described in your letter, is a common and widely distributed pest bearing the scientific name of *Lyctus striatus* Melsh. It is properly not a fly, but a small beetle belonging to the family Ptinidae. The department is frequently in receipt of letters relating to damage by this insect. It is rather a difficult insect to control, and the remedy I have formerly advised, and which is the only one which seems to promise success, is to paint or coat the timbers, buildings, or stored lumber with kerosene. The insect works near the surface of the wood, and the kerosene will penetrate sufficiently to kill the beetles and early stages. Benzine or gasoline may be used in lieu of kerosene if the latter is objectionable for any reason, but these substances will not be so effective on account of their more rapid vaporization.

(4) H. D. G. asks: 1. Can a house be lighted successfully with a current from storage batteries? My idea is to have the secondary battery

(Continued on page vi.)



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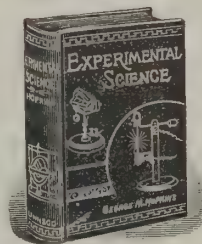
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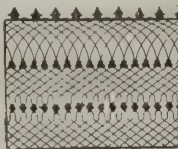
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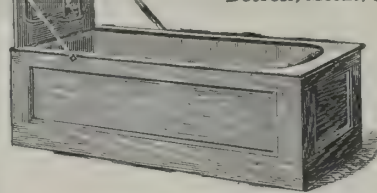
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(Continued from page iv.)

charged during the day by a gravity battery. A. A house
can be lighted in the manner suggested. 2. Is it practi-
cable, and would the cost exceed that of gas after the
apparatus is installed? A. We think you would find
the cost to exceed that of gas, if you count the attend-
ance and deterioration of the plant as items of expense.

(5) L. M. T. says: Would you kindly
inform a constant reader how to successfully kiln dry
oak lumber and not have it warp? We use 12 feet even
length best quality Wisconsin red oak. In piling we
have six sticks even thickness 2 feet apart, foundations
of piles perfectly level, but the lumber is not straight.
With exhaust in day we have 130 degrees, live steam at
night 160 to 180 degrees of heat. Sometimes in the
middle of drying we allow the kiln to cool down en-
tirely, for instance, stopping Saturday night, and not
starting it again till Monday morning. Does that affect
it? Is an even temperature necessary? What is the
right temperature for drying red oak when hot air is
not used? How is lumber dried with hot air? What
degree of heat and what size of blower? How can I
figure the pressure of force of any sized blower? A.
Try turning steam into the drying room at the same
time it is turned upon the coils. Keep the room moist
in this way until the lumber gets heated to 130° or 150°.
Then shut off steam from the room and continue the
heat with very little ventilation. This will dry the lum-
ber evenly and make it less liable to warp. It is better
to have an even heat, and the drying should be finished
within the week. It is better for drying oak to heat to
200° if possible. This you can do with live steam by
closing drying room nearly tight during the last of the
process. Ventilating blowers give about two ounces
pressure per square inch. The pressure depends upon
the speed. Address Buffalo Forge Company, Buffalo,
N. Y., for their blower circular, which gives size, ve-
locity, and pressure, and also in regard to forced hot
air drying.

(6) A. B. asks: 1. How can I test well
water for injurious matter, animal or vegetable? A.
Chemical and bacterial analysis is the best way of do-
ing this, and even such analyses are not of absolutely
certain interpretation. One simple method for a home
test is to drop some sugar into the sample and leave it
undisturbed. If it remains clear it is assumed to be of
good quality, otherwise, not. 2. What books can I get
on that subject? A. We can supply you with Wank-
lyn's "Water Analysis," price \$2; "Examination of
Water for Sanitary and Technical Purposes," by Leff-
mann & Beam, \$1.50 by mail post paid.

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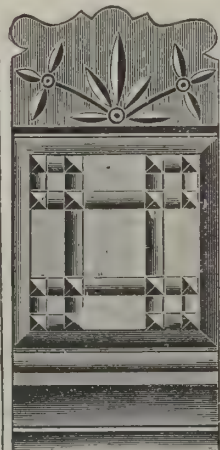
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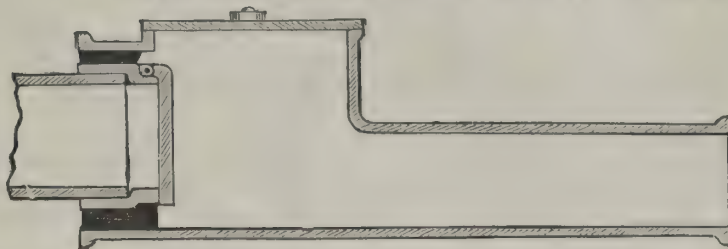
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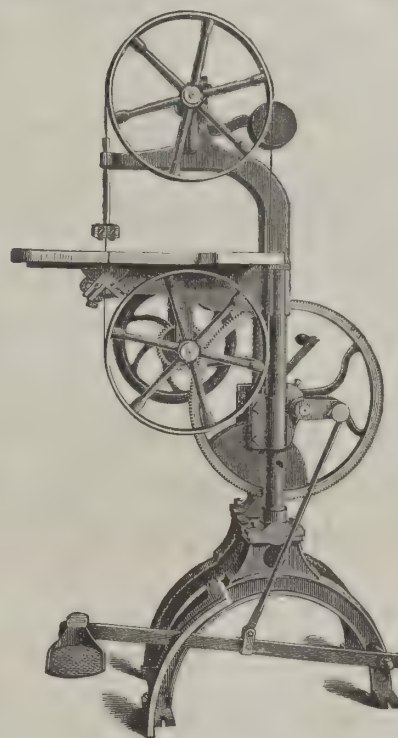


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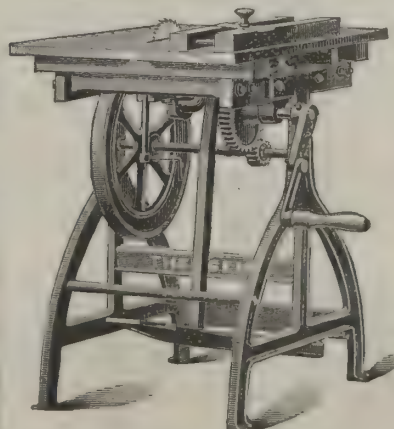
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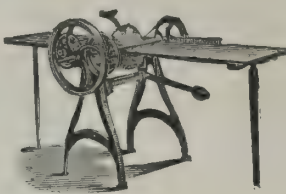
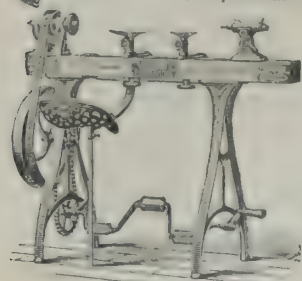


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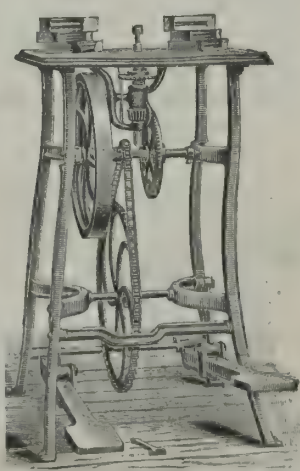
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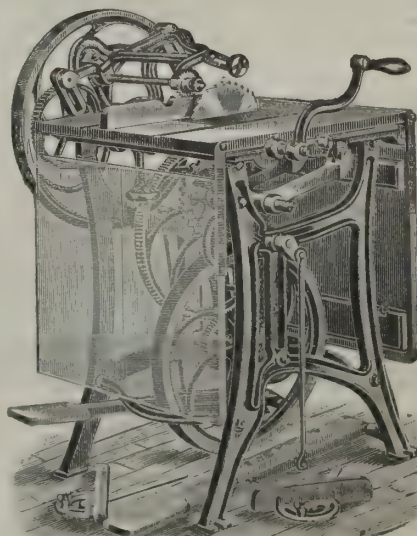
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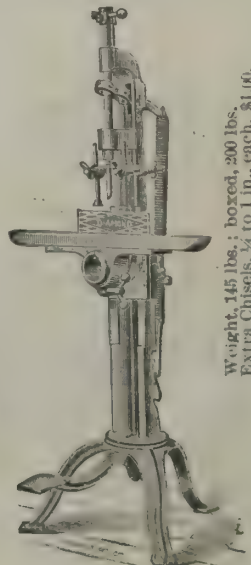
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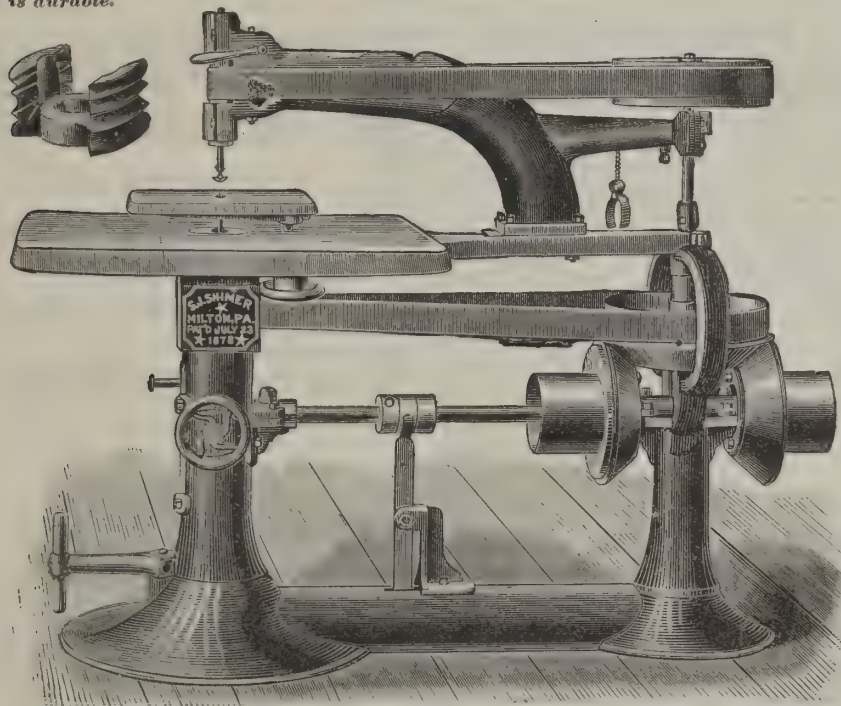
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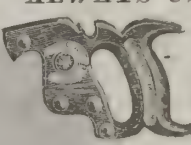
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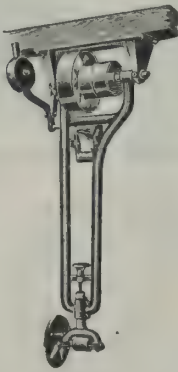
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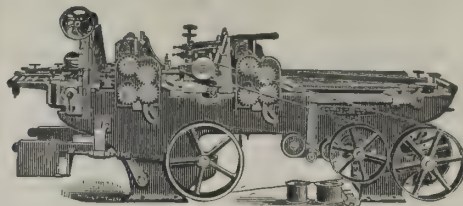
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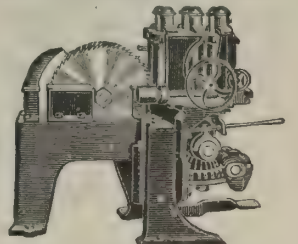
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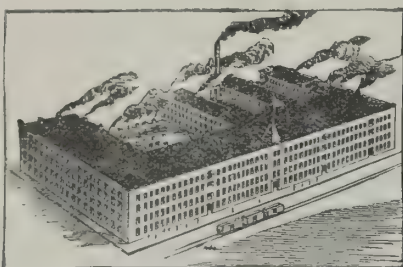
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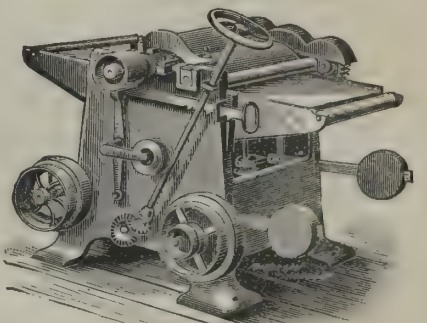
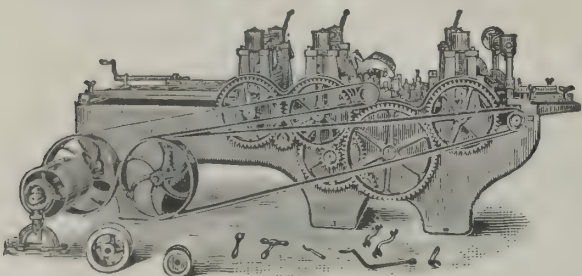
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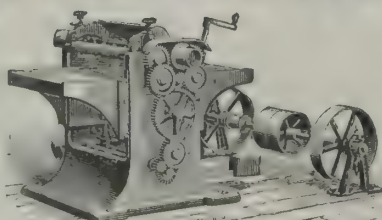
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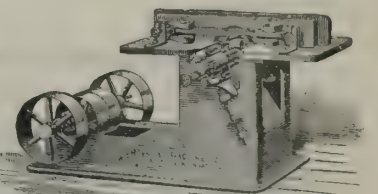
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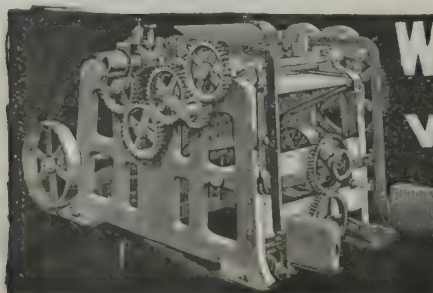
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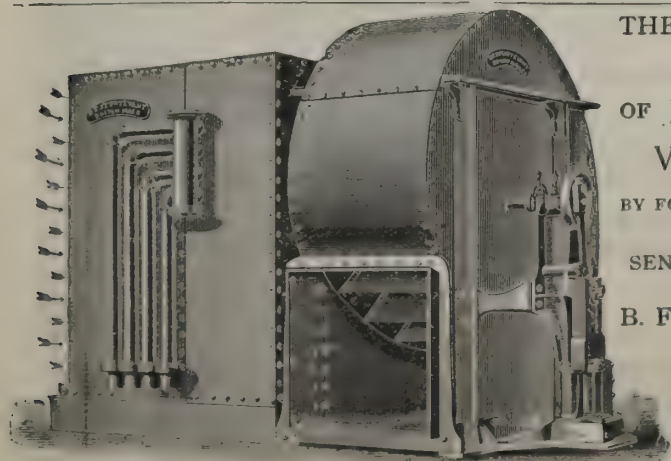
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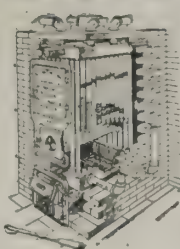
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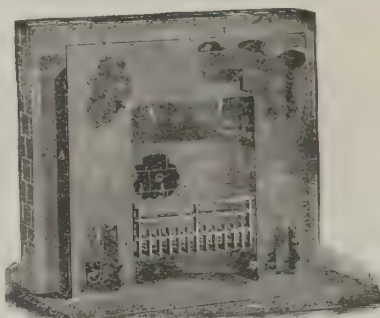
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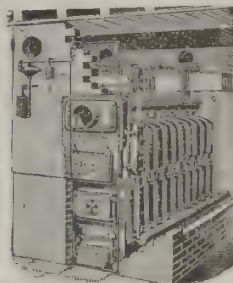
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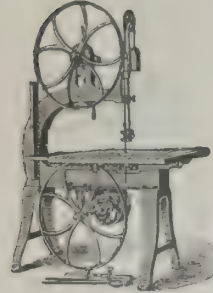
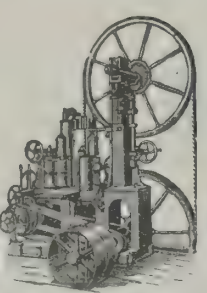
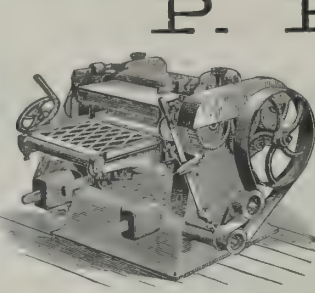
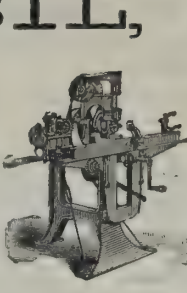
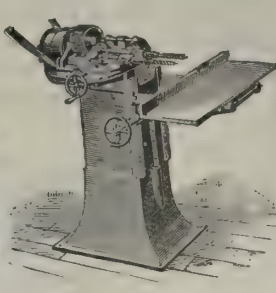
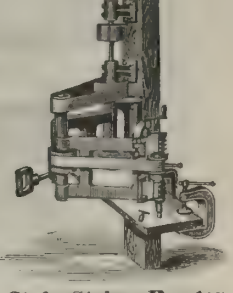
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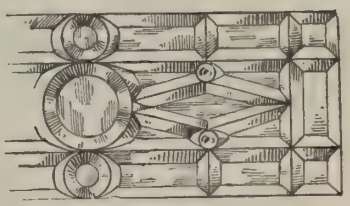







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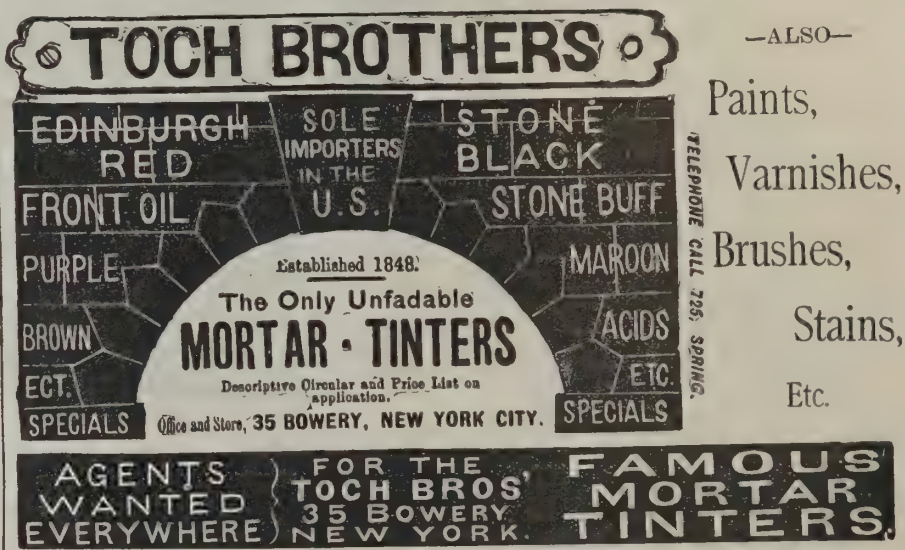


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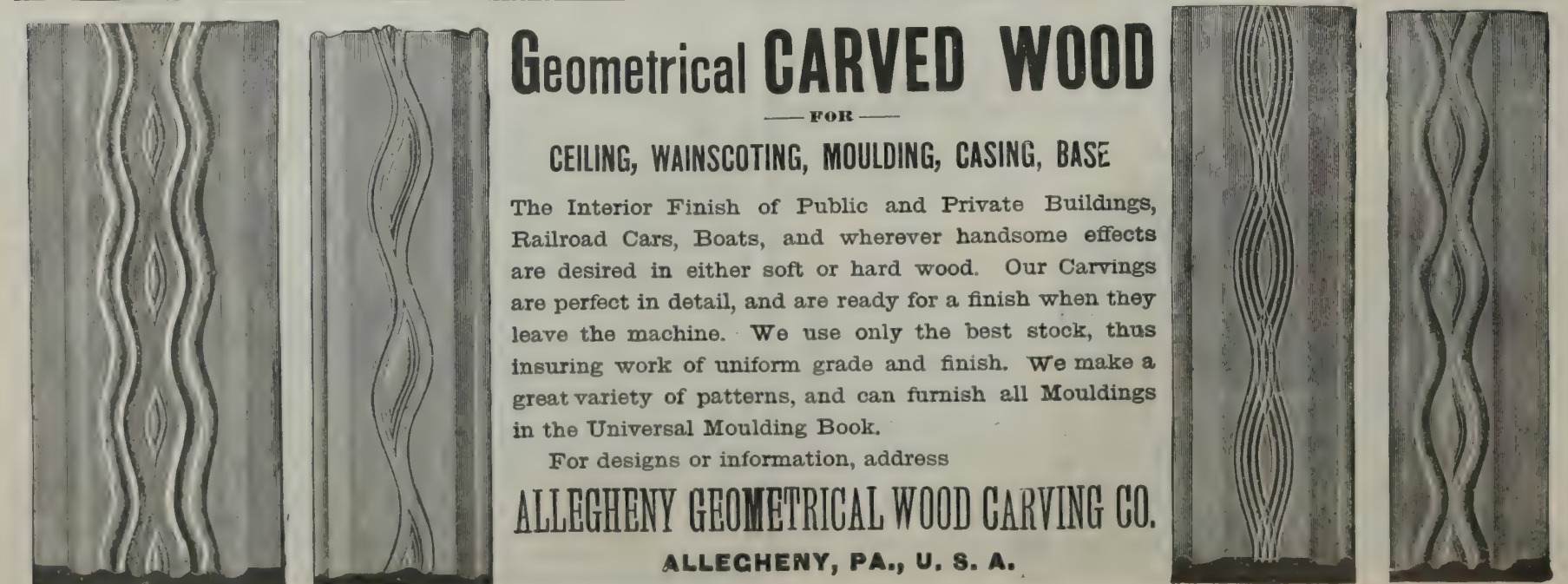
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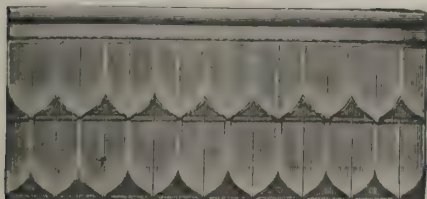


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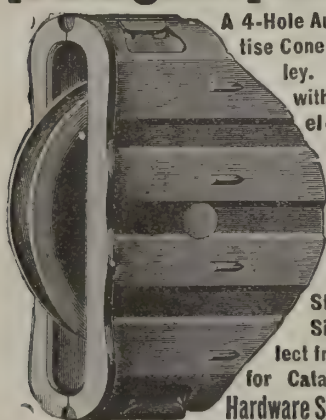
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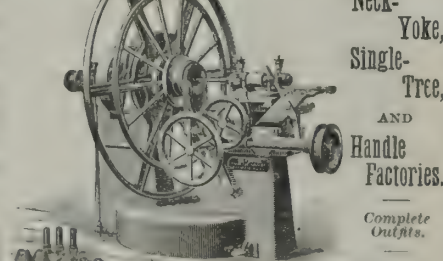
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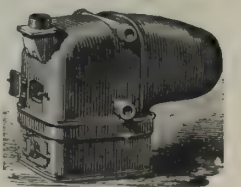
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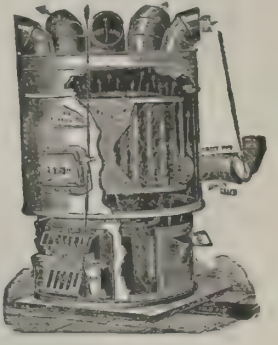
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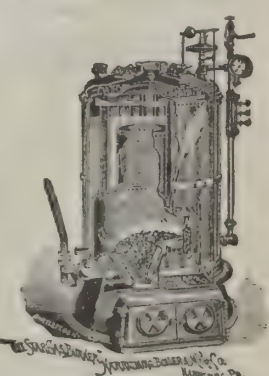
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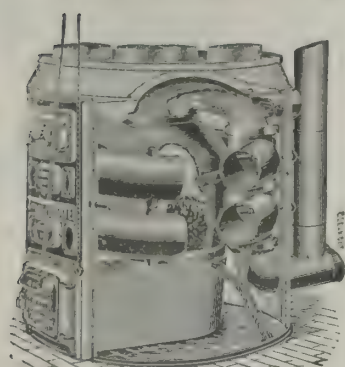
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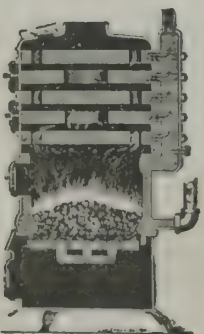
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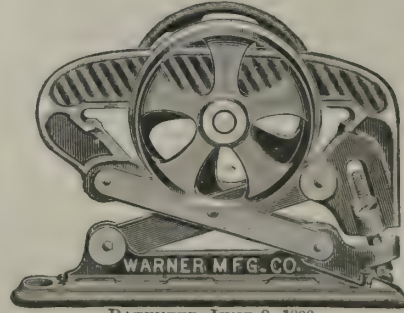


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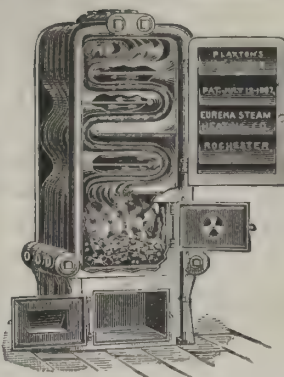
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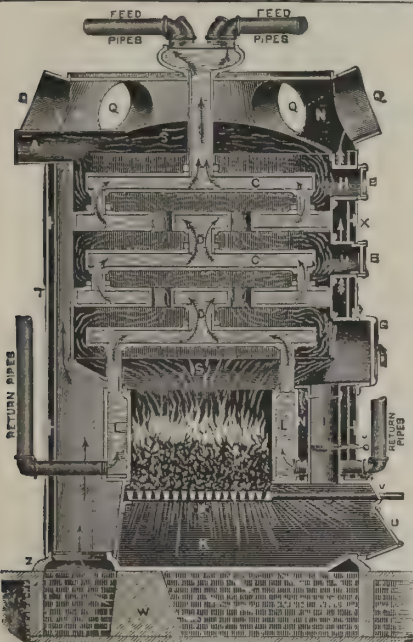
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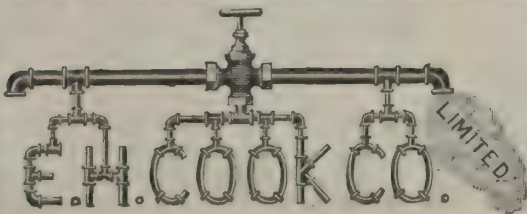
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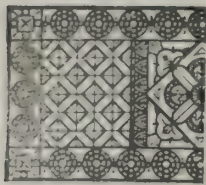
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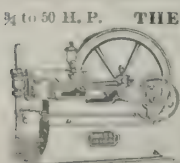


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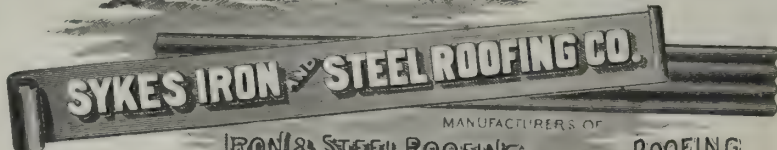


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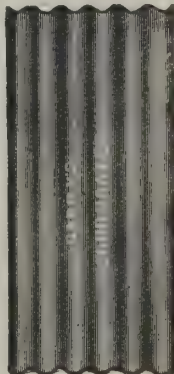
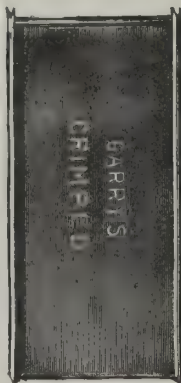


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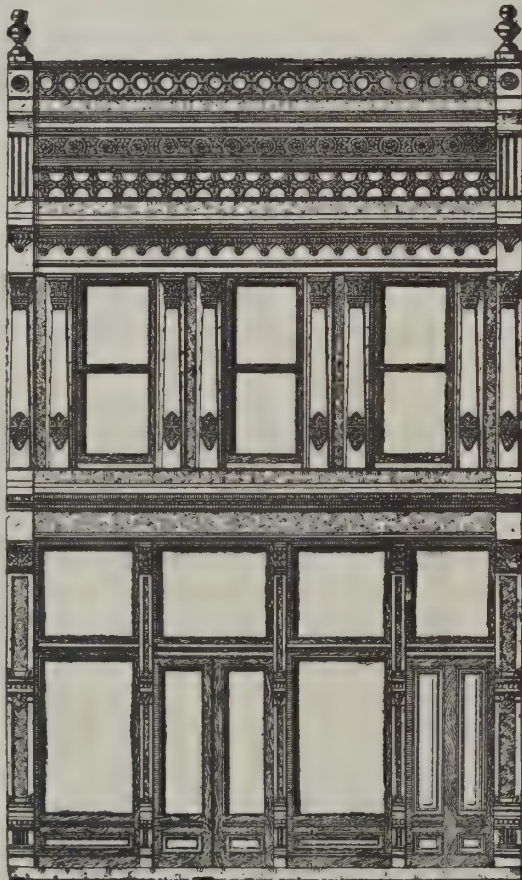
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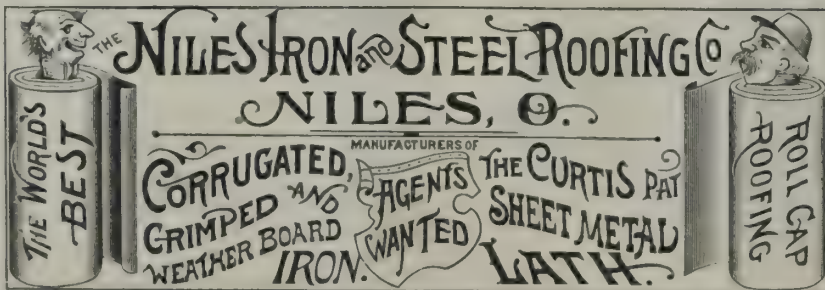
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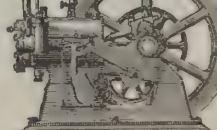


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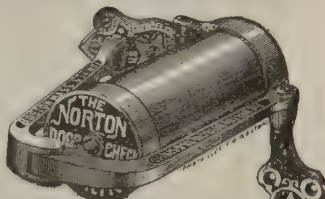
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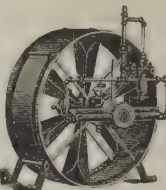


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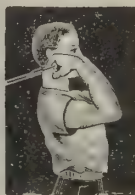
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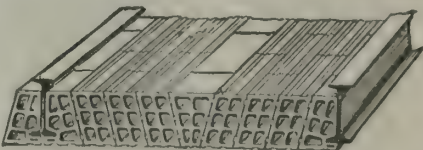
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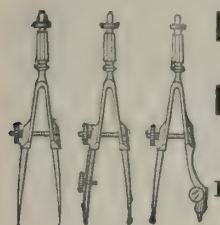
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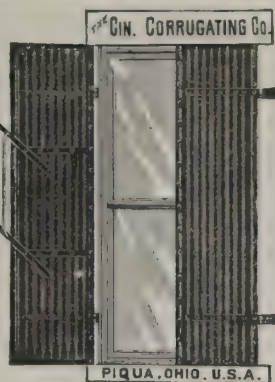
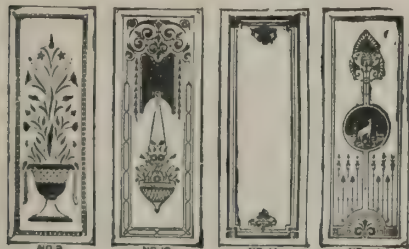
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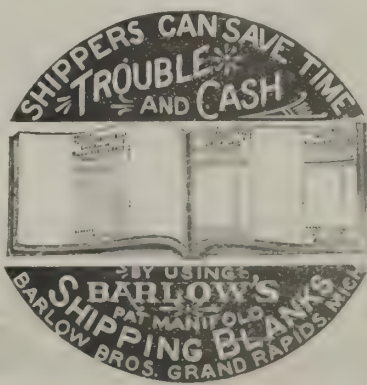
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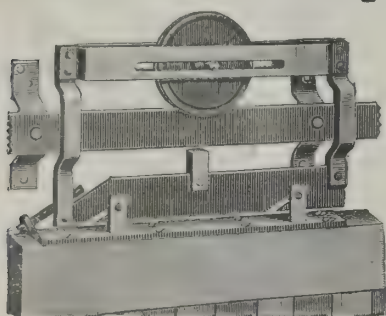
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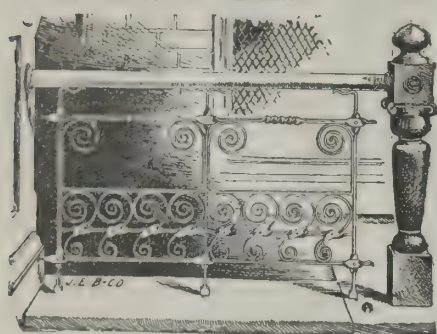
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(Continued on page vi.)

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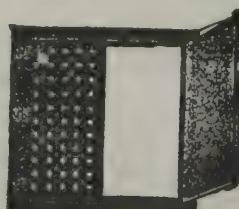
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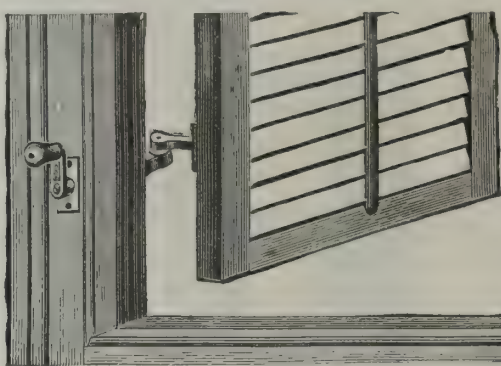
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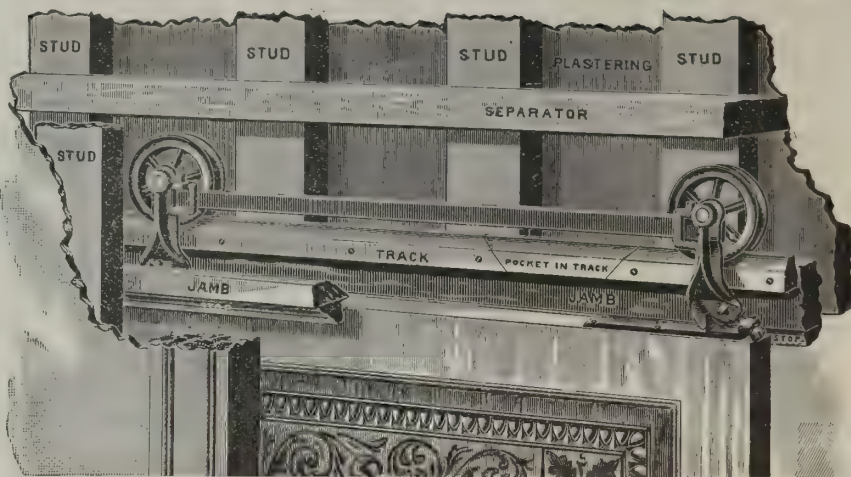
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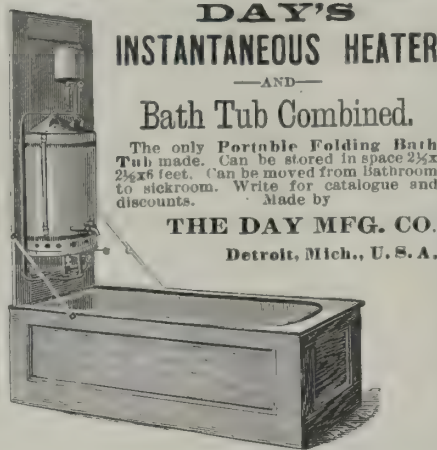
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(Continued from page iv.)
way off. A steel cap is good to strike on. See SCIENTI-
FIC AMERICAN SUPPLEMENT, No. 107, on methods of
driving well pipes.

(7) T. J. asks for receipts for some
cheap wash that will protect a wall plastered with com-
mon mortar against the effect of rain and consequently
from frost. How will skim milk with lime or cement
do? How about the solutions of oxide of zinc and
chloride of zinc? Would a wash with Portland cement
be sufficient? A. Whitewash used on United States
public works: 1/2 bushel best lime slaked with boiling
water, 1 peck salt dissolved in warm water, 3 pounds
ground rice boiled to a thin paste, 1/2 pound ground
whiting, and 1 pound clear glue dissolved in warm wa-
ter. Mix all together, add hot water for proper use,
and let it stand for several days. Then heat and apply
with large brushes. Chloride and oxide of zinc are
good but expensive. Portland cement makes a fair
brown wash. Skim milk may be used with cement and
zinc oxides.

(8) J. H. S. writes: I desire to know
whether a cellar can be so constructed as to keep out
the water? If so how? The cellar in question is now
built, but will not keep out water, though well ce-
mented. A. A cellar can be constructed so as to be
waterproof, if the bottom or floor is first covered with
cement, the walls built thereon laid in cement, and the
exterior of the wall covered with cement. This makes,
practically, a watertight basin. The cement used must
be the best Portland cement one part, clean sharp sand
one part. After a cellar is built it is not so easy to make
it waterproof. Still it can be done. Cover the exterior
of the wall with the above cement, ditto the bottom, and
work the cement in under the bottom of the wall. If
these directions are followed, you will succeed. But
if cheap materials are used and the work badly done,
you will be sure to fail. A drain put around the out-
side of the wall or even inside below the cellar floor
may be efficient in carrying off the water, if you can
give it a good delivery.

(9) W. S. asks: Is a vessel made of
galvanized iron suitable for keeping water for drink-
ing? A. This is a somewhat debated question. If
kept clean and if the water was pure and not allowed
to stand long in the vessel, we should consider it safe,
but as neglect might result in making the water poi-
sonous, we should recommend the use of tin in prefer-
ence. Soluble compounds of zinc are poisonous. For
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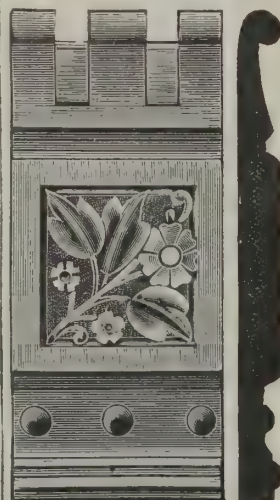
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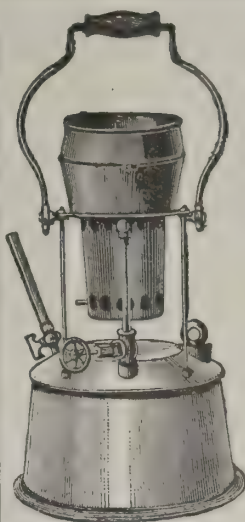
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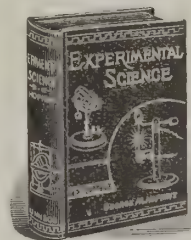
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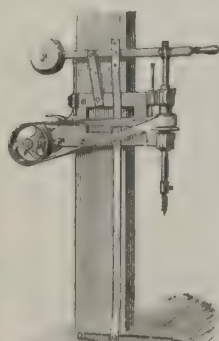
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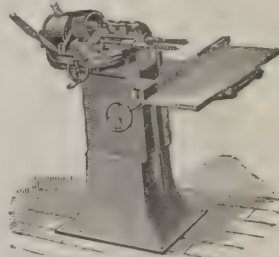
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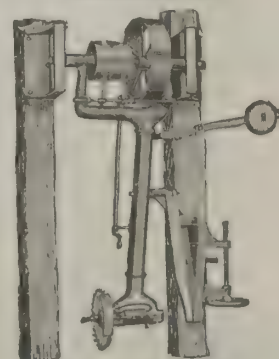
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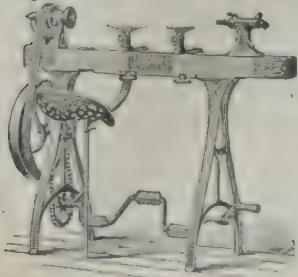


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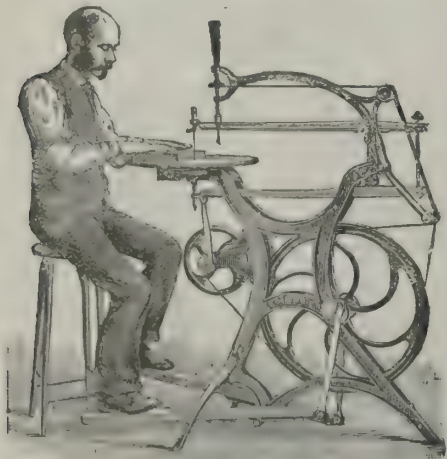
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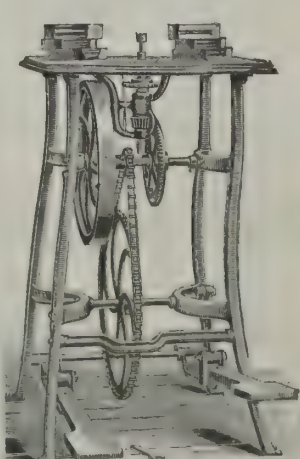
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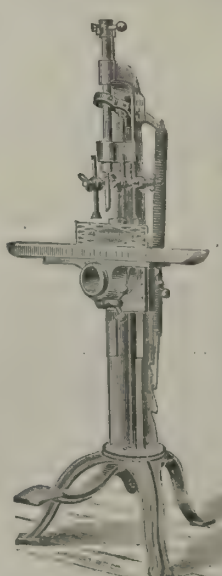
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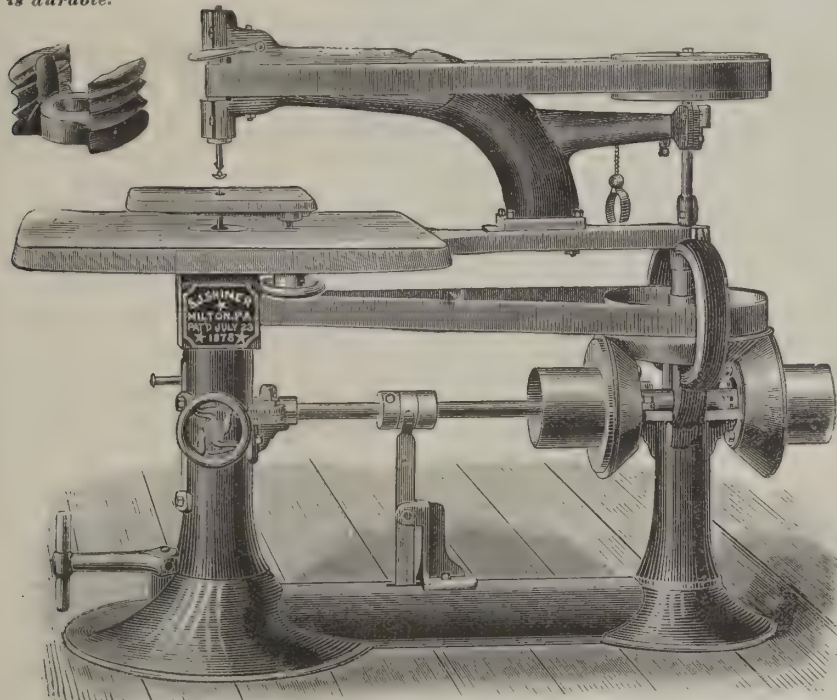
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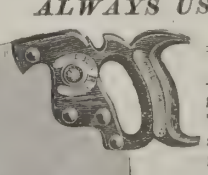
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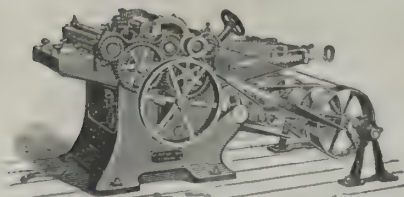


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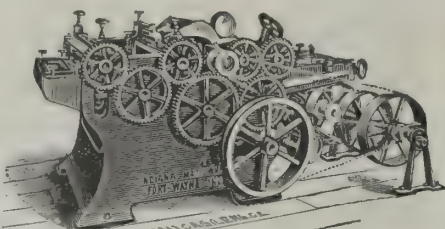


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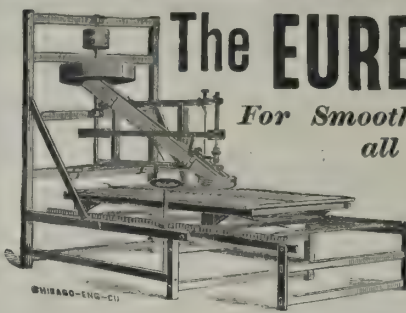
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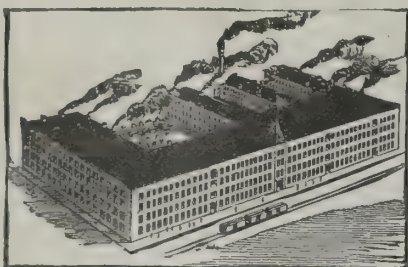
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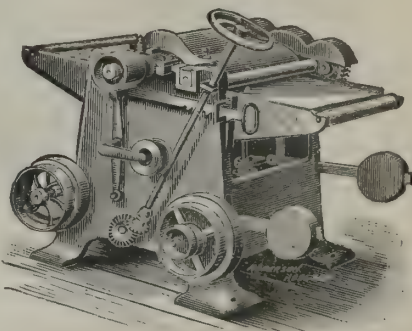
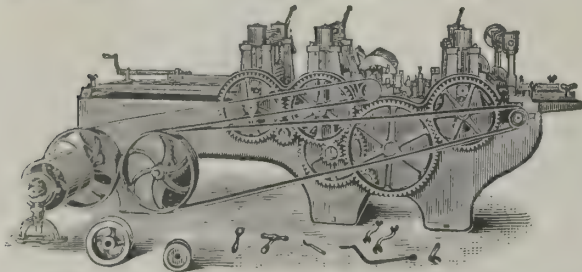
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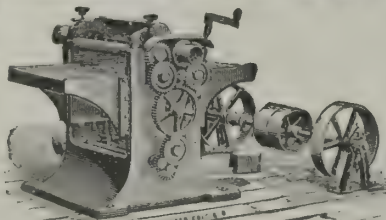
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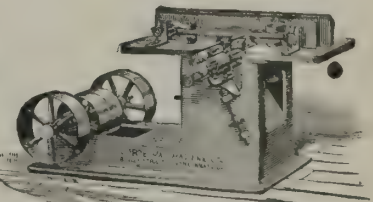
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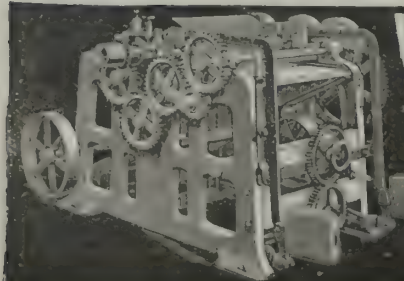
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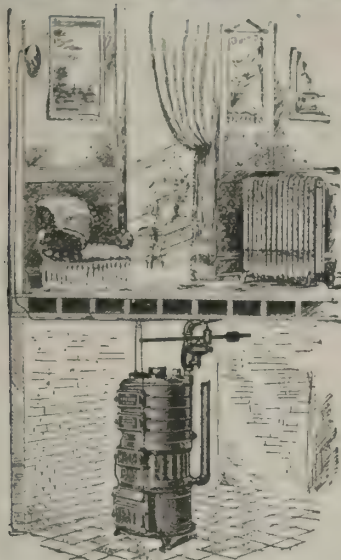
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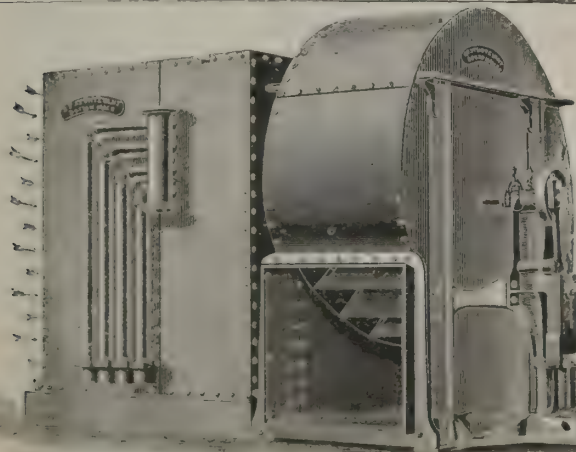
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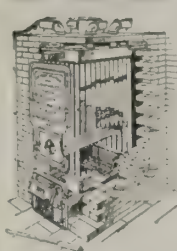
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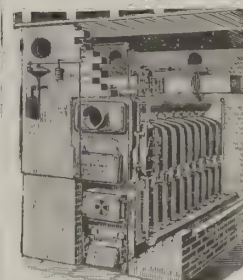
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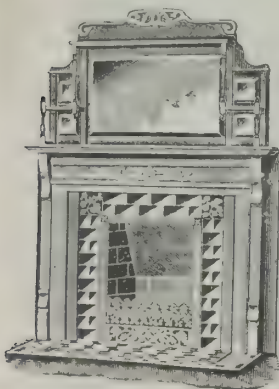


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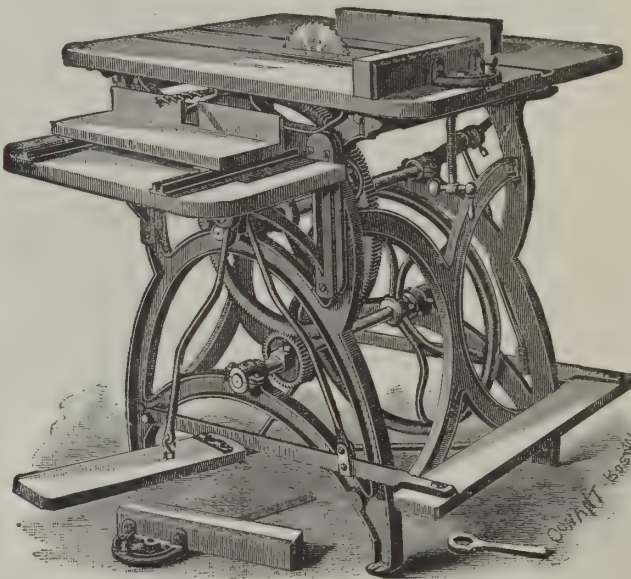
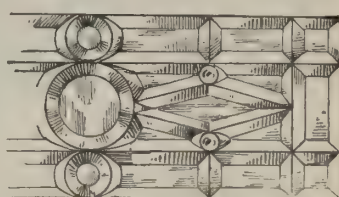
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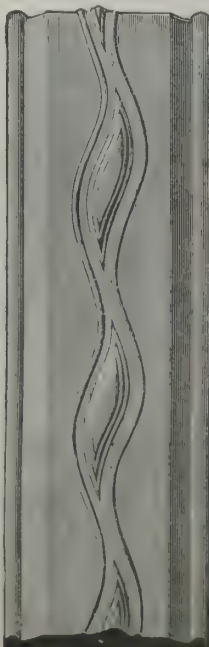
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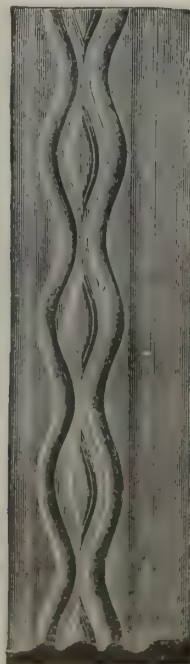
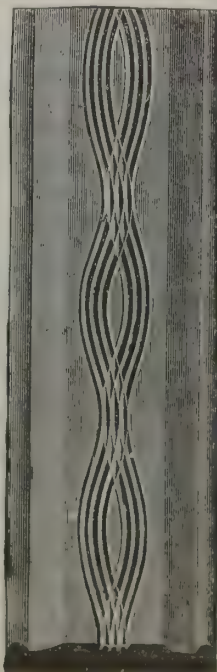
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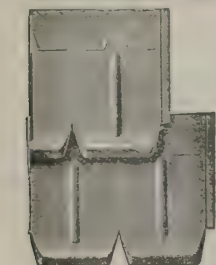


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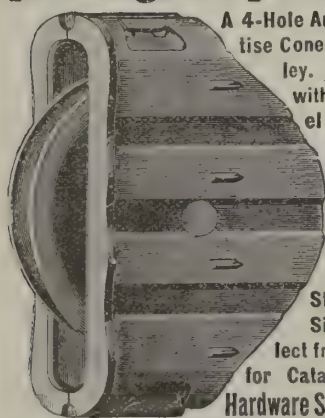
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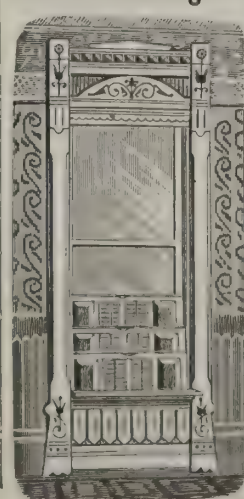
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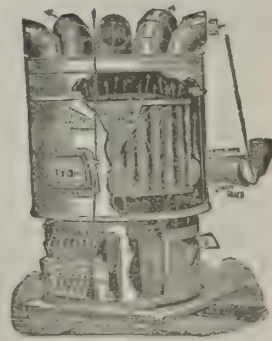
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Adam Dickey.vi Standard Wood Turning Co.vi	Art Metal Work. W. H. Mullins.iii	Artistic Wood Decorations. Mankey Decorative Co.xii	Artists' Materials. F. W. Devoe & Co.i	Asbestos. H. W. Johns Mfg. Co.cover iii H. F. Watson.cover iii	Balusters, Stair Rails, Etc. Anderson & Dickey.vi S. E. Smith & Bro.xiii The Standard Wood Turning Co.vi	Base, Head and Corner Blocks. Lidell & Williams.vi	Basin Cocks. Stebbins Mfg. Co.vii	Bath Boilers. Iron Clad Mfg. Co.vi	Bath Tubs. Haines, Jones & Cadbury Co.vii Oswego Indurated Fiber Co.cover ii	Bath Tubs, Self-Heating and Folding. Combination Folding Bath Tub Co.xiv The Day Mfg. Co.vi	Bent and Beveled Glass. Vanhorne, Griffen & Co.vi	Blinds, Sliding and Folding. Wm. Willer.xiii	Boiler Coverings. H. W. Johns Mfg. Co.cover iii	Boilers (Seamless Drawn Copper House.) Randolph & Clowes.Page i	Boring Machines. Millers Falls Co.cover iv	Brass Furniture Fittings. Am. Brass and Metal Works.xii	Brass Goods. Randolph & Clowes.i	Brass Work for Buildings. Andrews Mfg. Co.xii E. T. Barnum.cover iv Am. Brass and Metal Works.xii J. E. Bolles & Co.iv Howard & Morse.xii	Brass Working Machinery. P. Prybil.vii	Bricks—Plain, Pressed, Front, and Ornamental. Jarden Brick Co.vi	Brick Machinery. Henry Martin Brick Machine Mfg. Co.v	Building Fronts and Cornices. W. H. Mullins.iii	Building Paper, Felt, Etc. H. F. Watson.cover iii	Carpenters' Tools and Machinery. F. A. Rich. Stanley Rule and Level Co.cover ii	Carpet Lining. H. F. Watson.cover iii	Carved Wood for Ceilings, etc. Allegheny Geometrical Wood Carving Co.xii	Ceilings (Metal). Kinnear & Gager Co.cover iii H. S. Northrop.cover iii	Cements. H. W. Johns Mfg. Co.cover ii	Chandeliers. I. P. Frink.xi	Church Crosses. F. W. Jones.xiii	Colored Glass for Churches, Dwellings, Etc. The Tiffany Glass Co.cover ii	Combination Dividers. L. S. Starrett.ii	Concrete. Hygienic Concrete Co.xv	Concrete Illuminating Tile and Vault Lights. T. H. Brooks & Co.iv Jacob Mark.xiv	Conservatories, Greenhouses, Etc. T. W. 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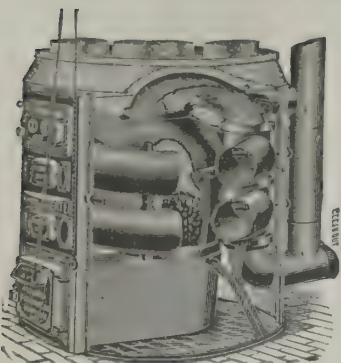
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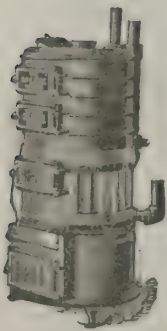
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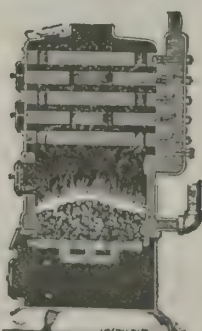
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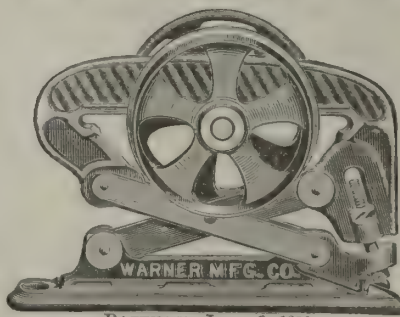
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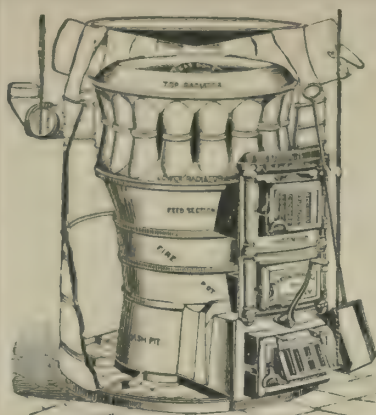
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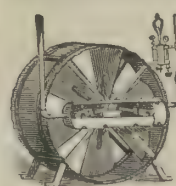
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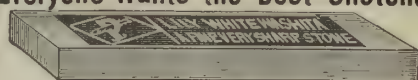
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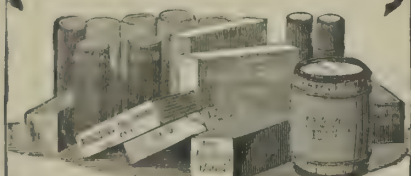
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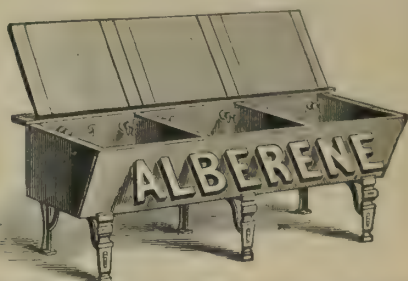
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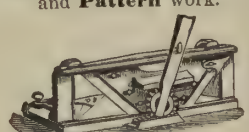
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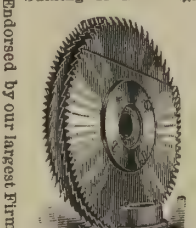


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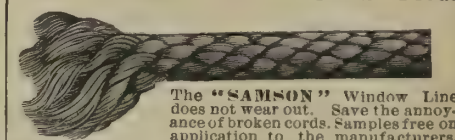


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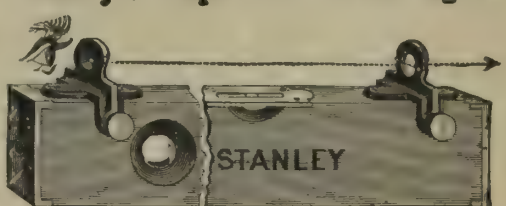
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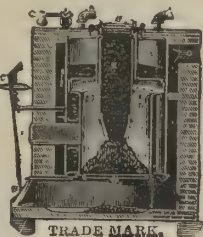
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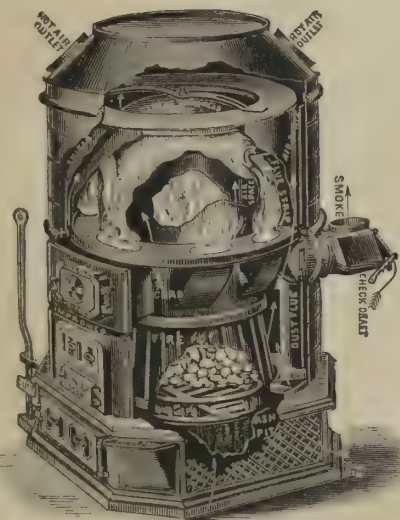
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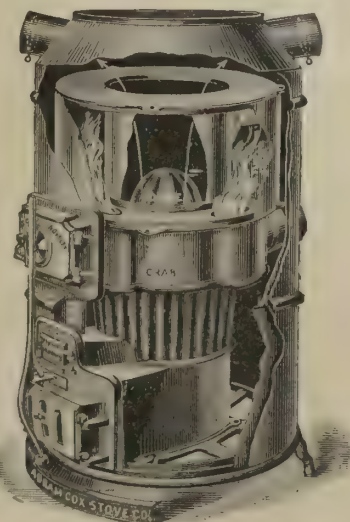
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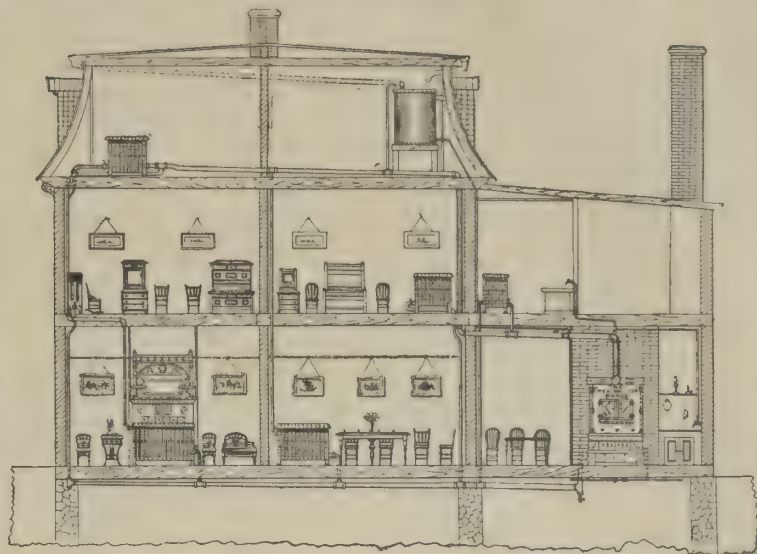


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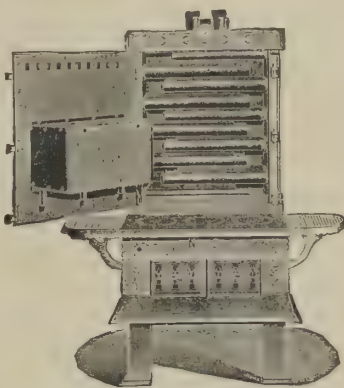
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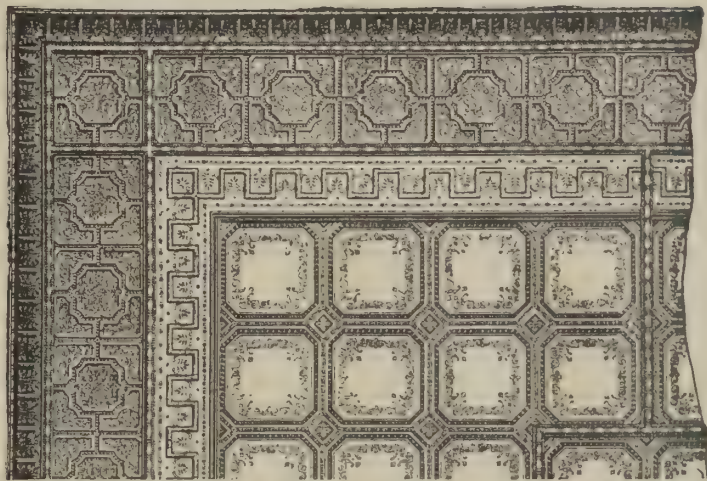


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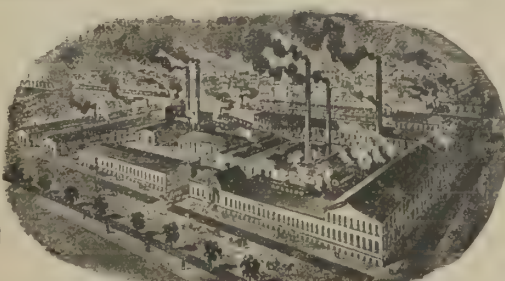
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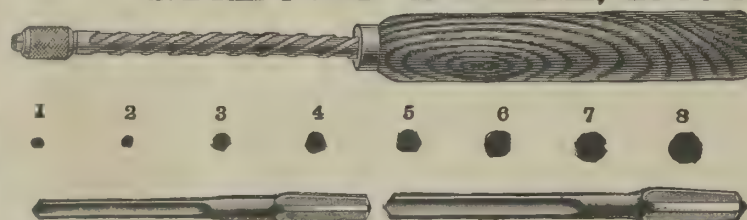
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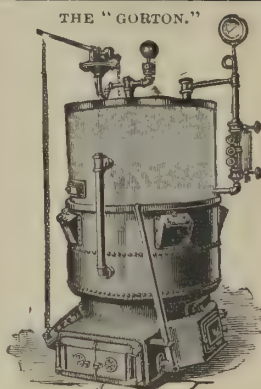


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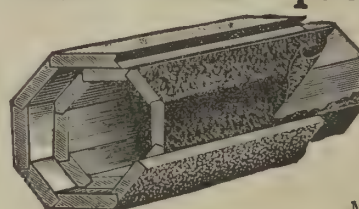
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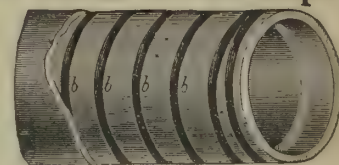
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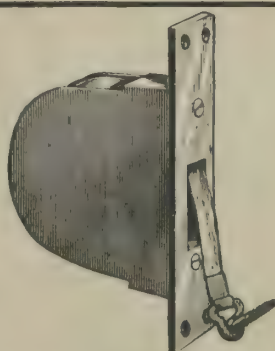
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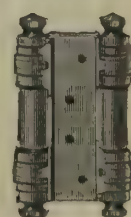
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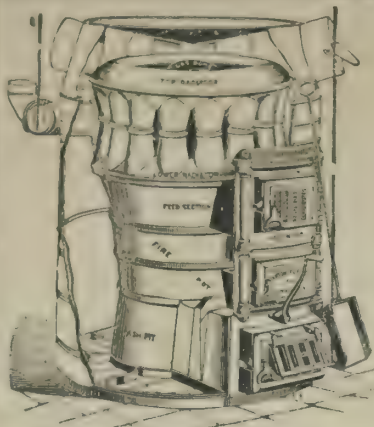
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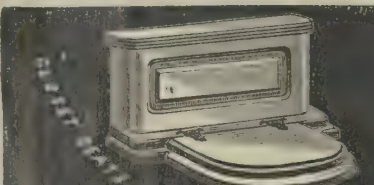
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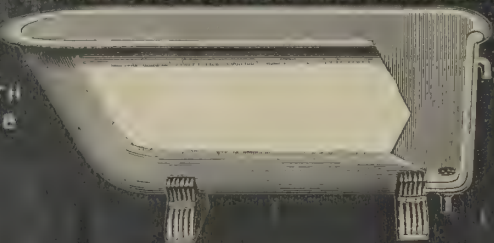
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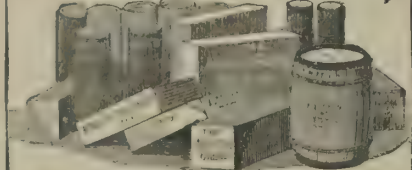
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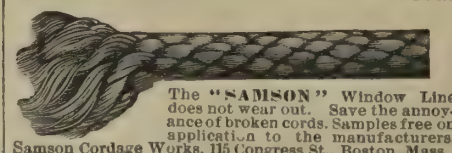
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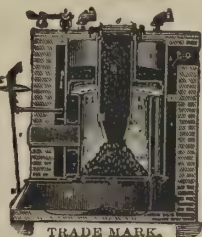
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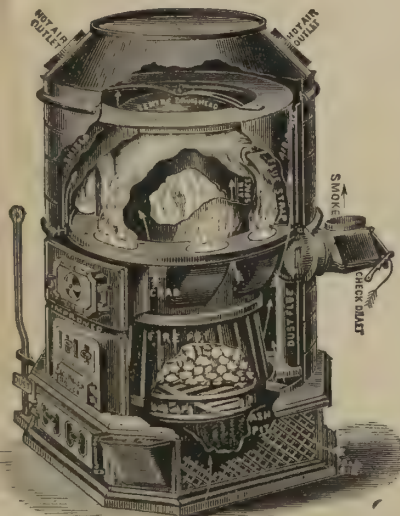
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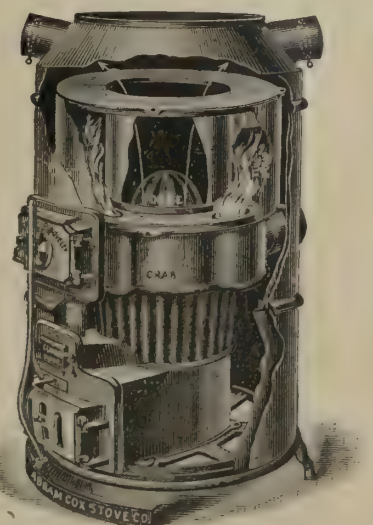
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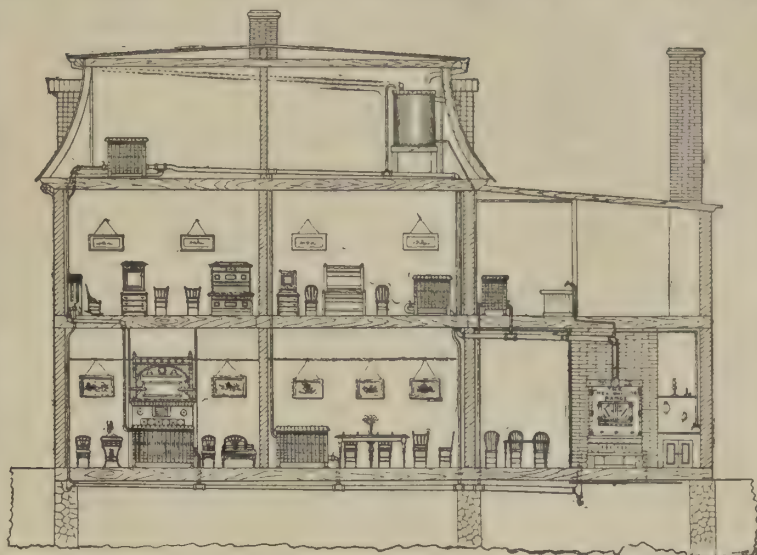


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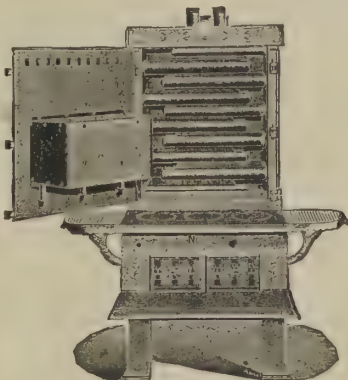
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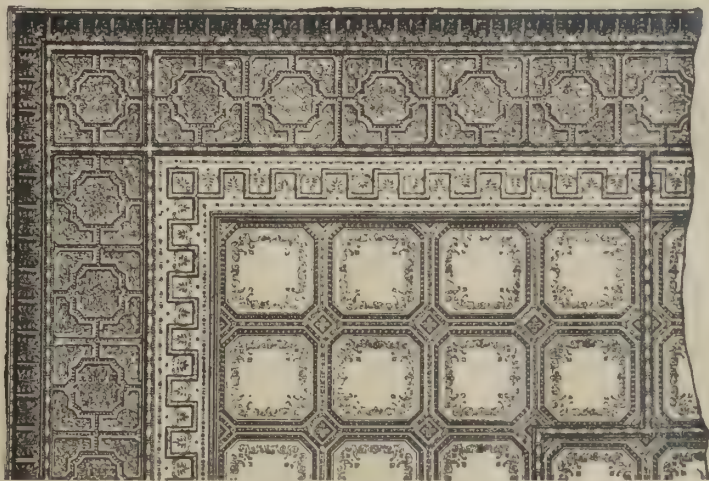


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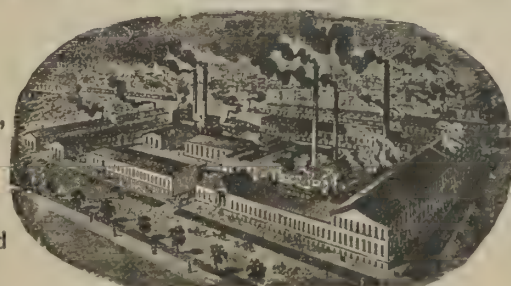
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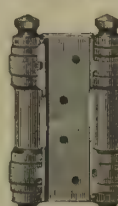
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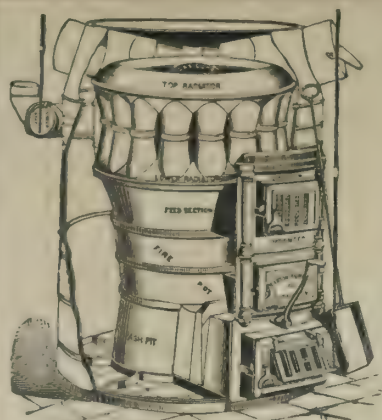
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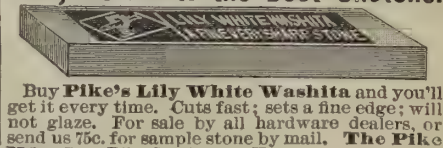
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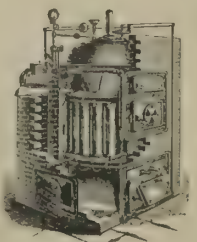


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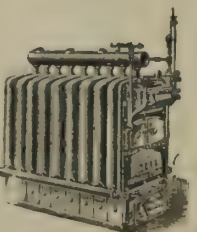
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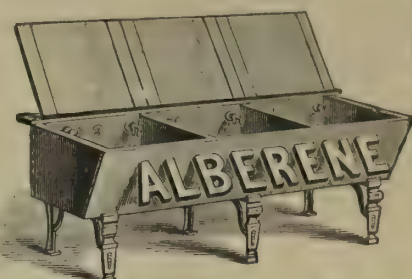


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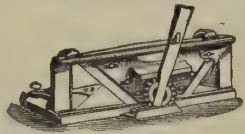
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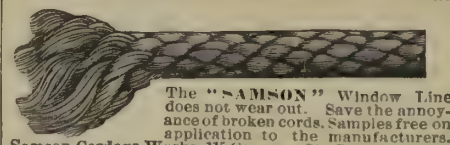
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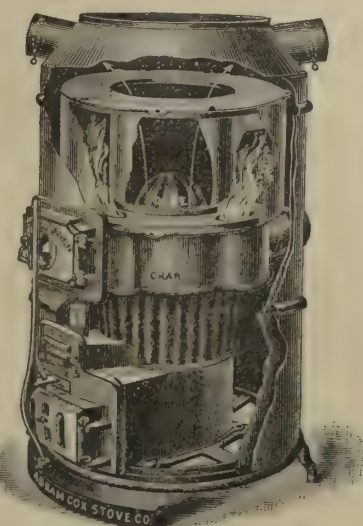
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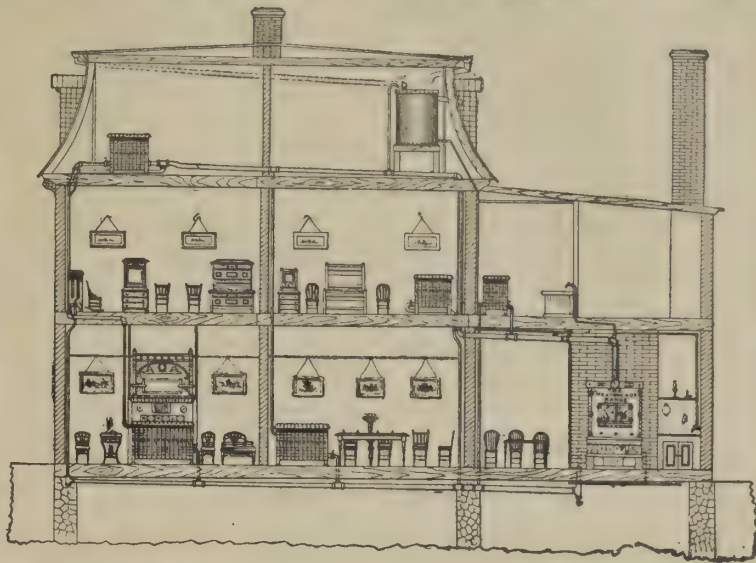


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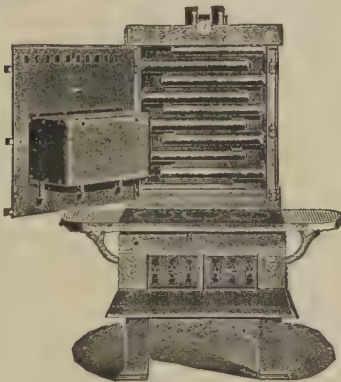
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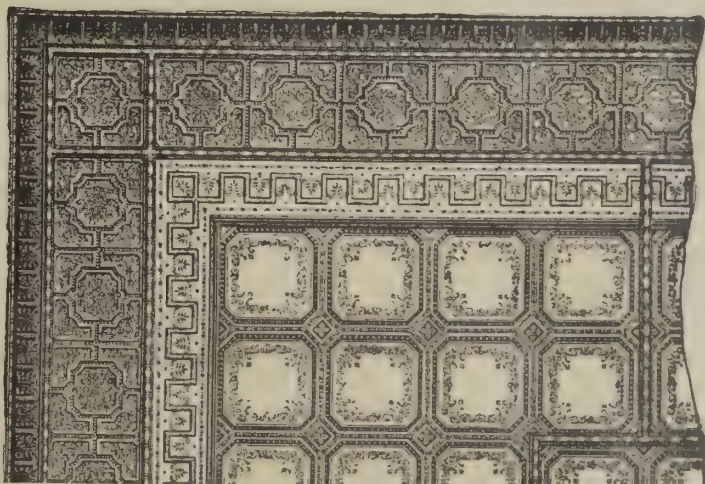


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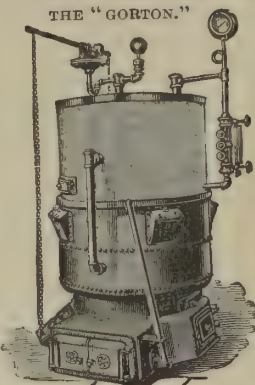
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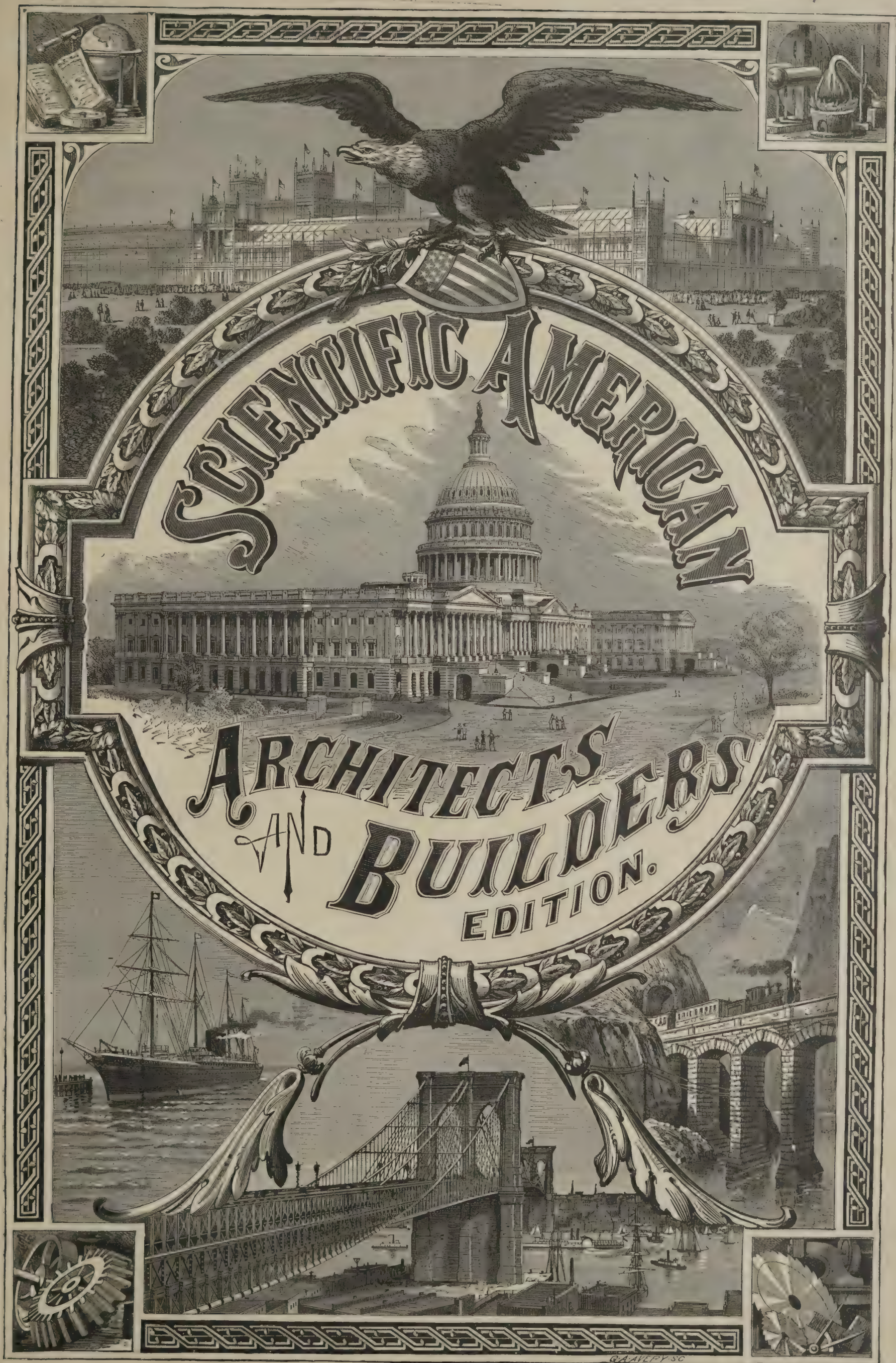
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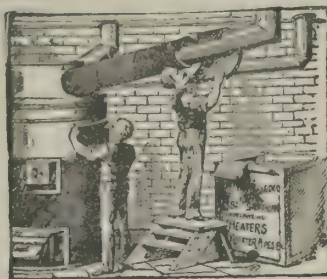
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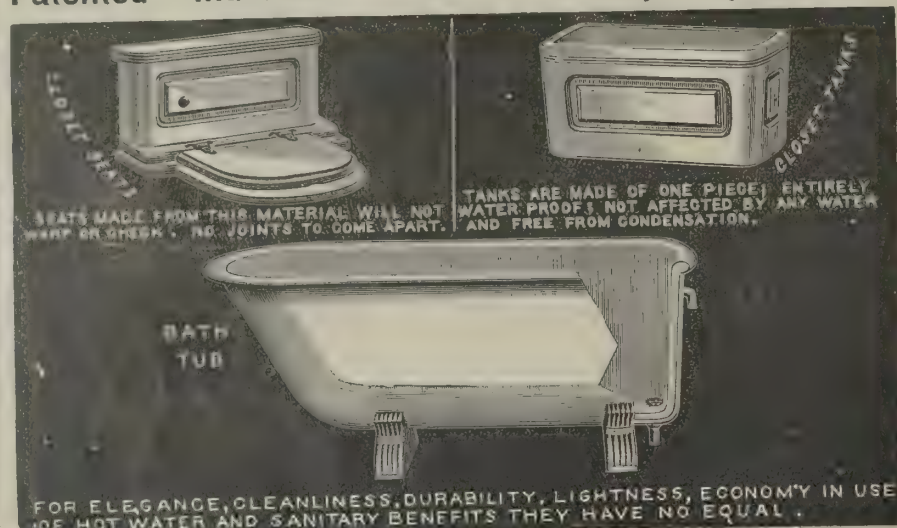
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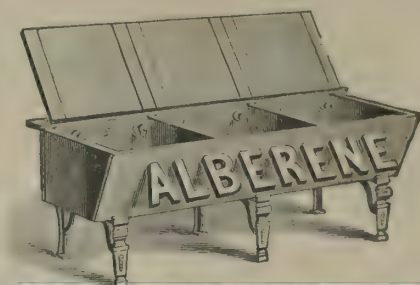
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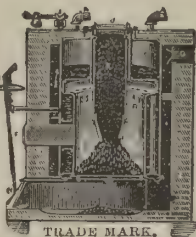
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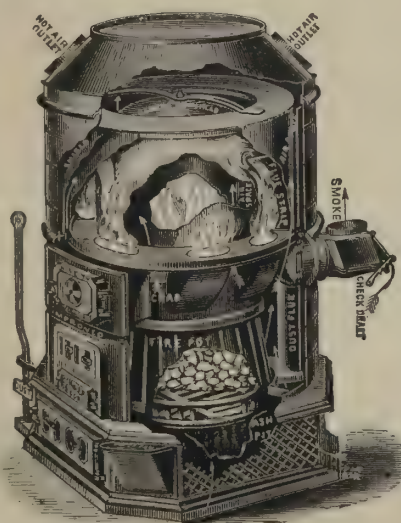


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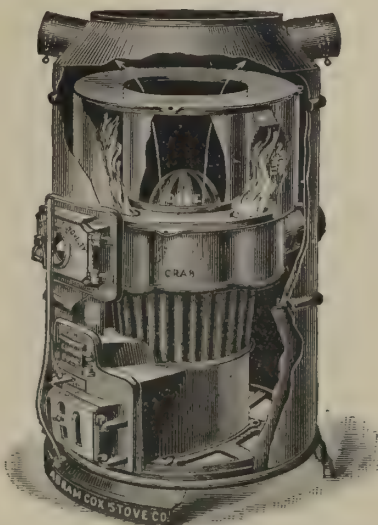
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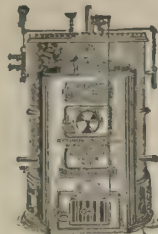
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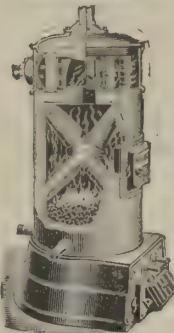


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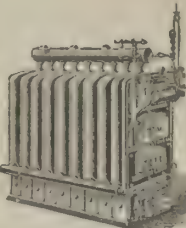
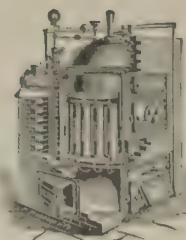
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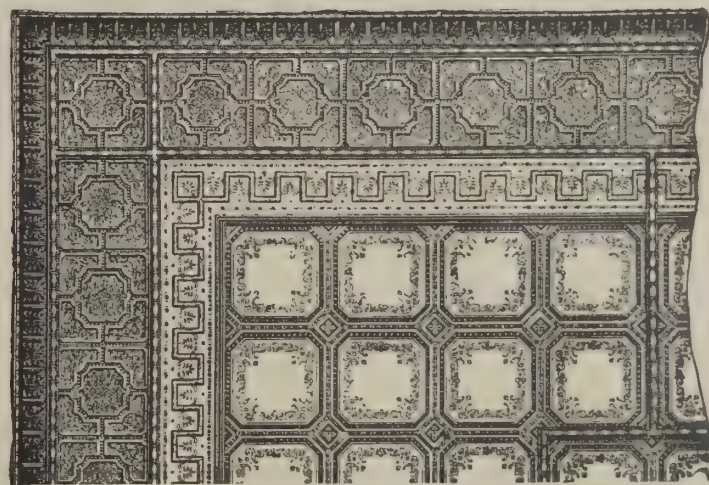
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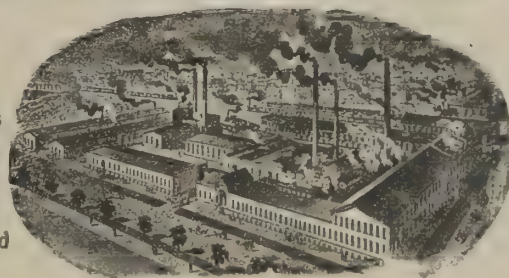
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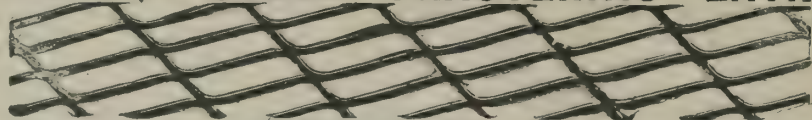
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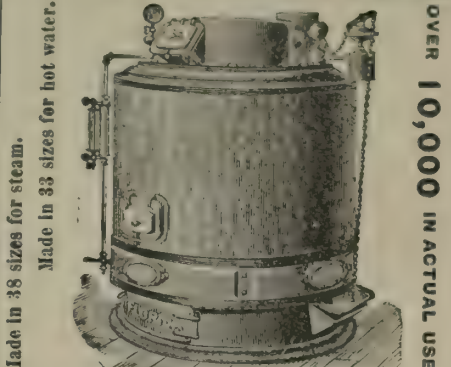
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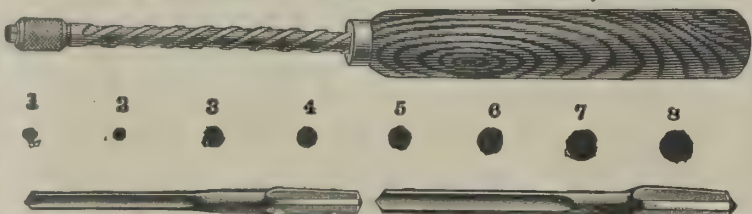
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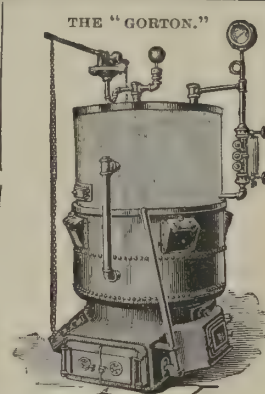
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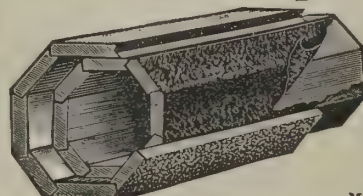
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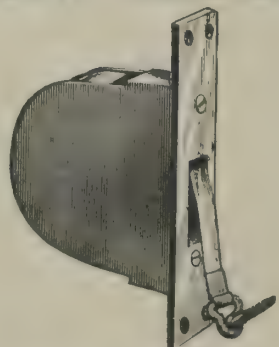
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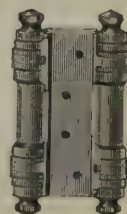
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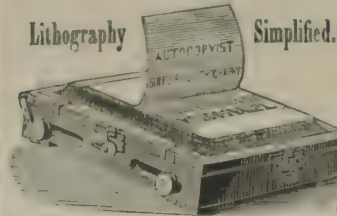


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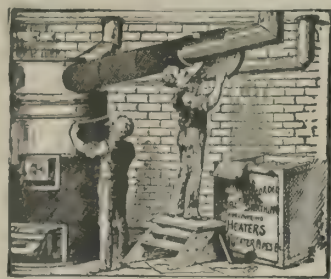
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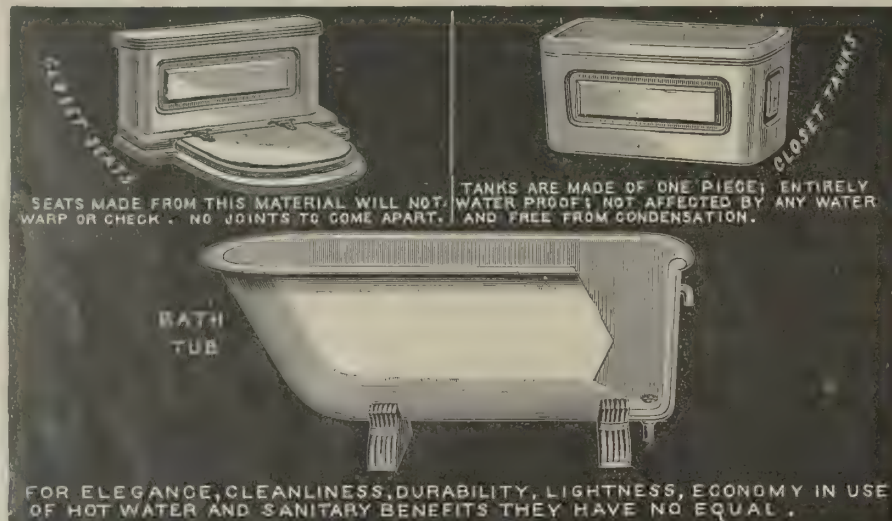
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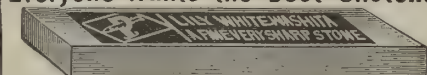
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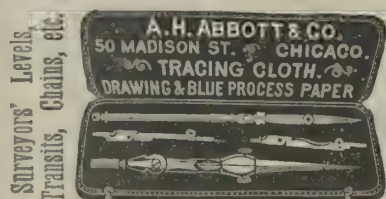


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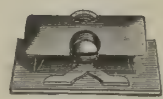


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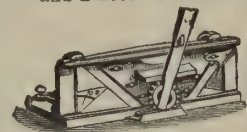
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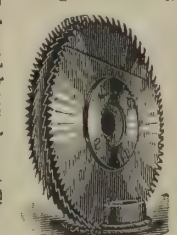
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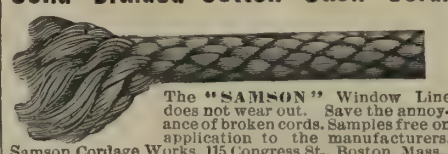
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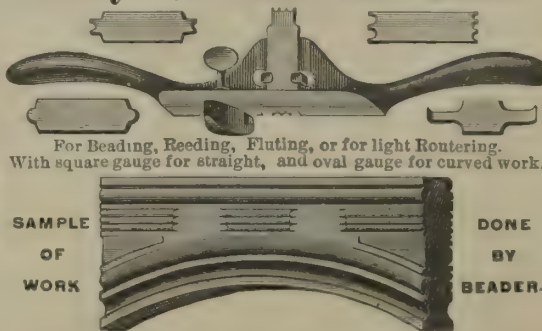
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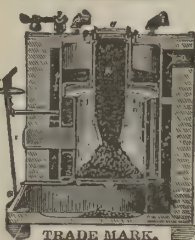
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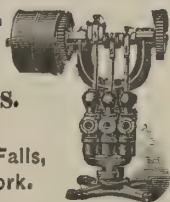
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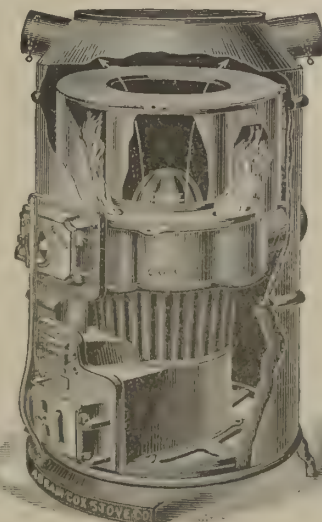
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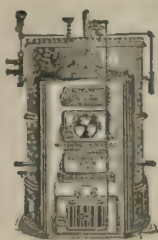
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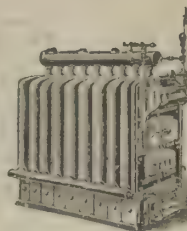
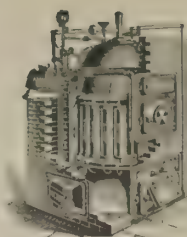
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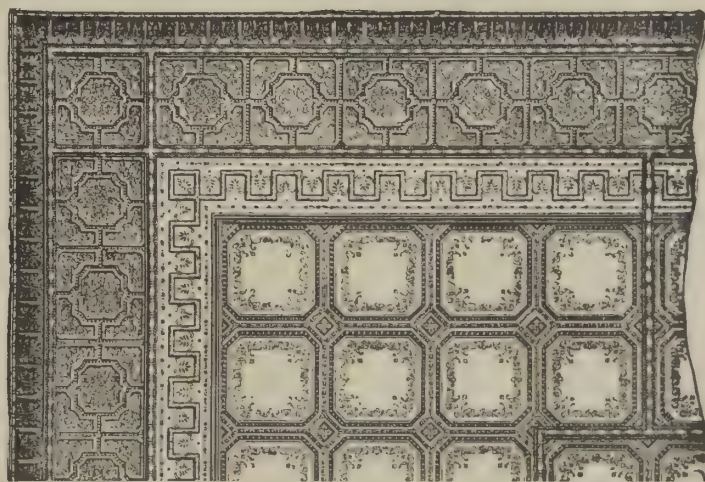
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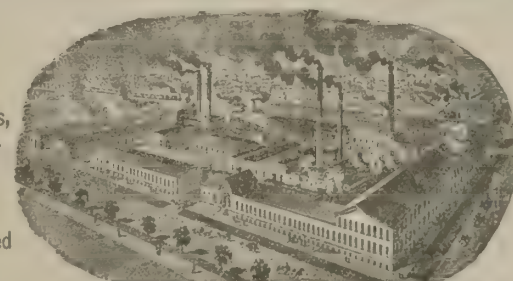
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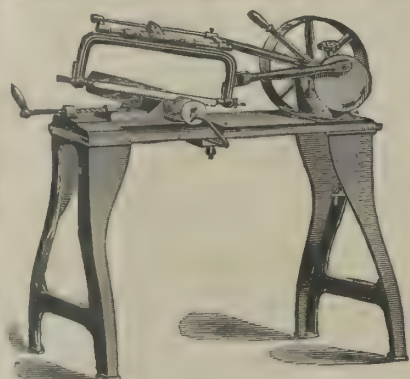
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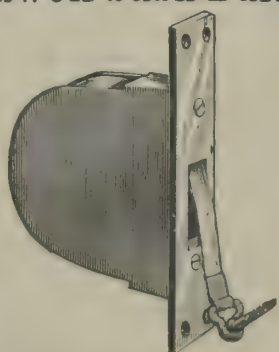
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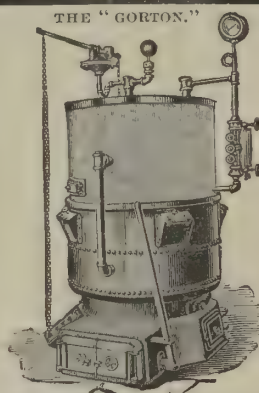
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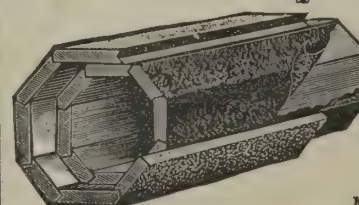
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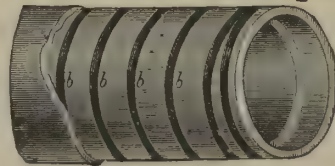
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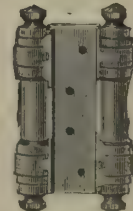
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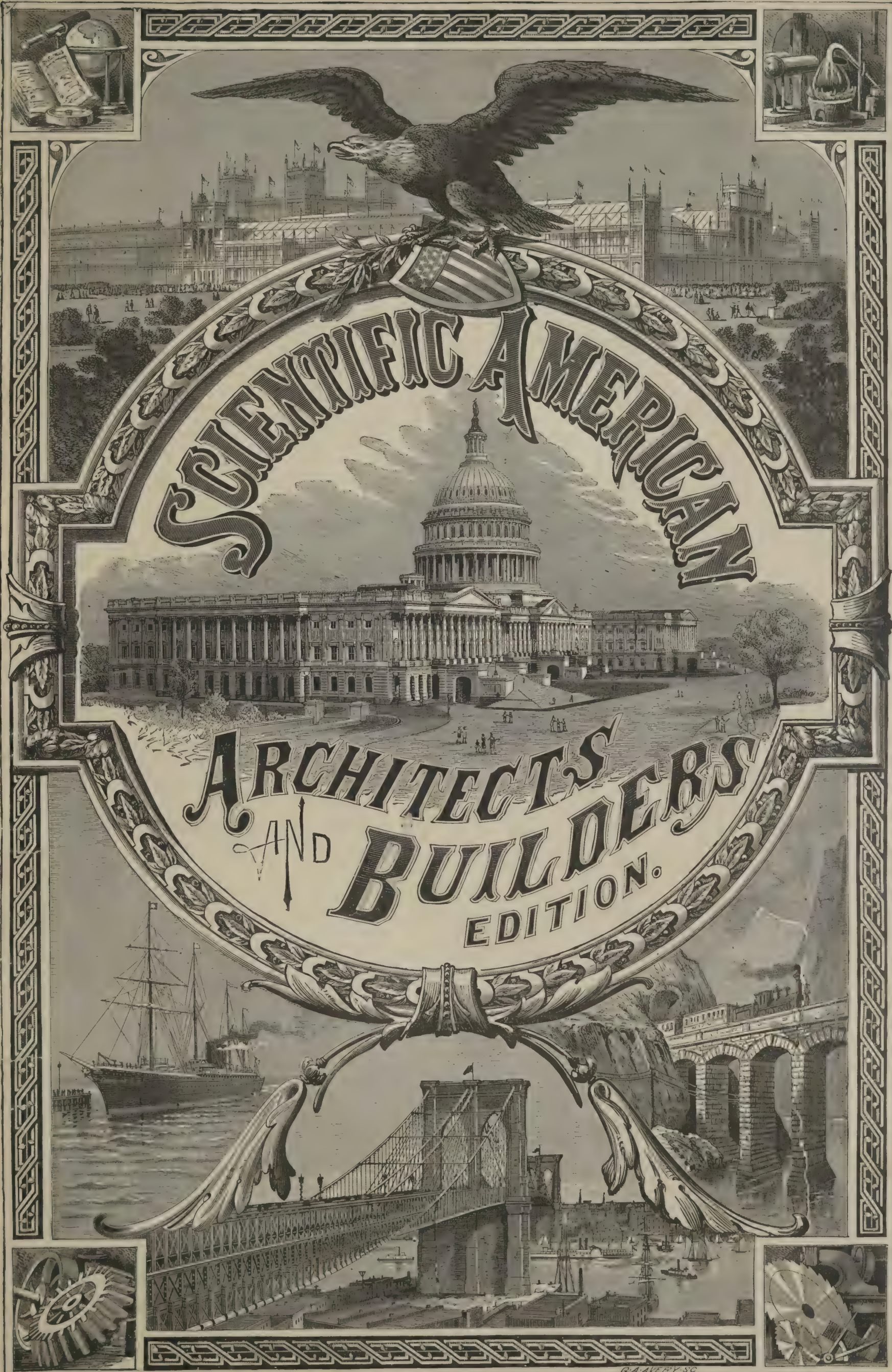
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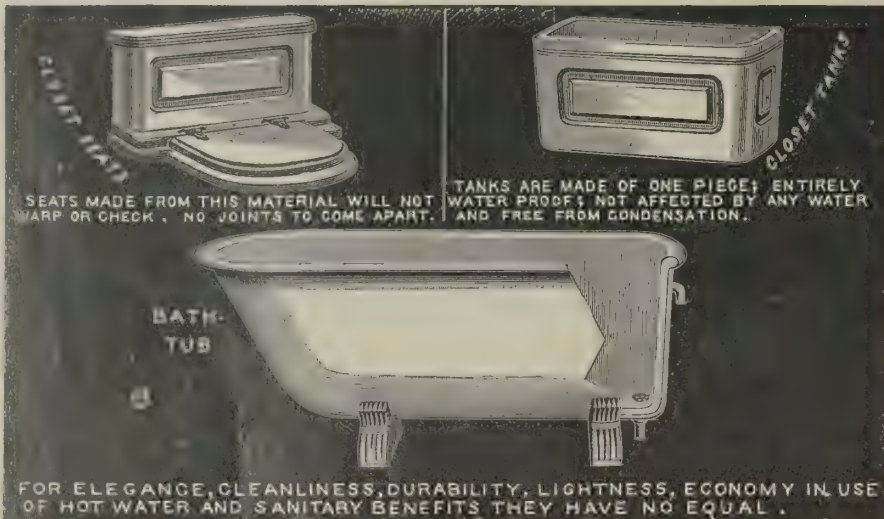
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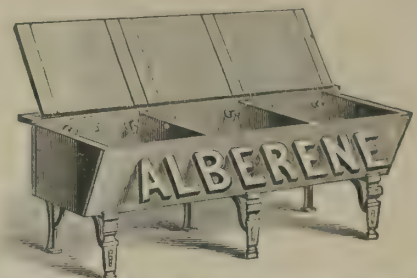
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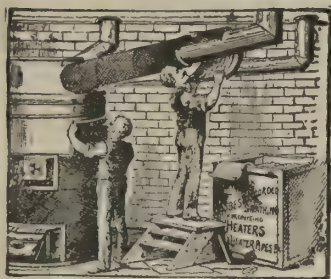


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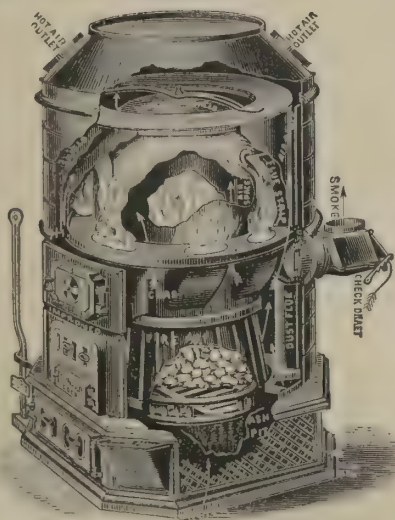
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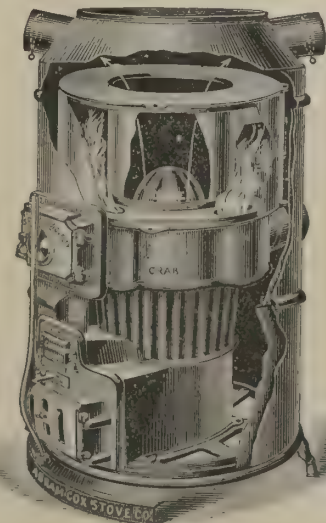
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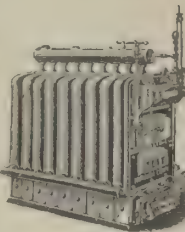
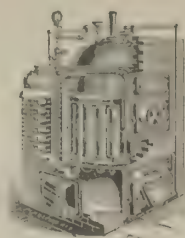
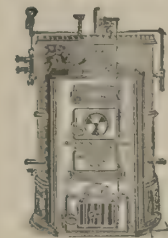
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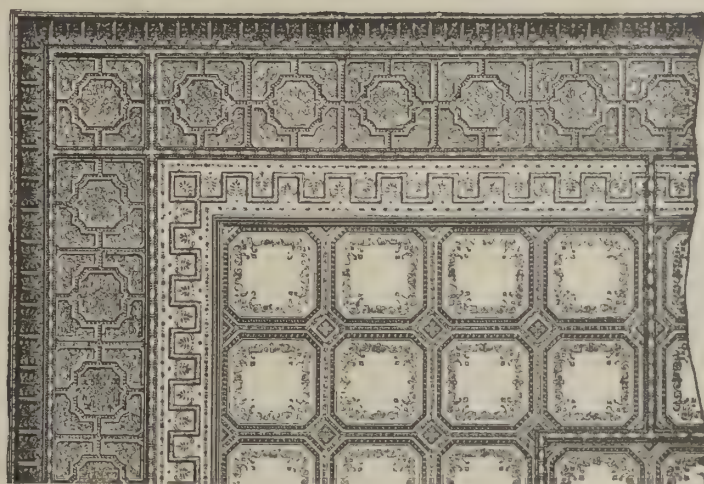
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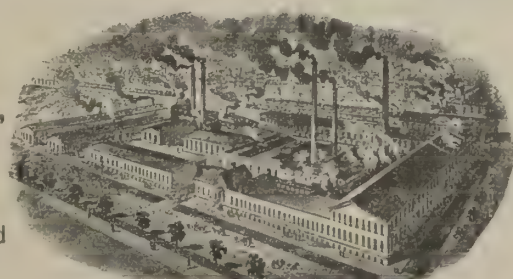
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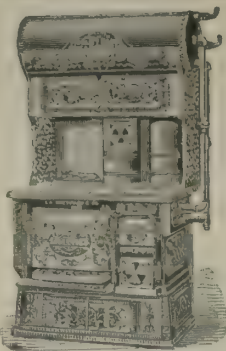
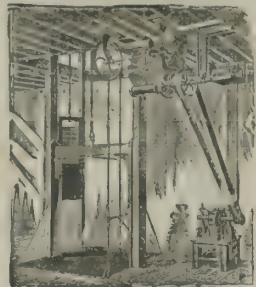
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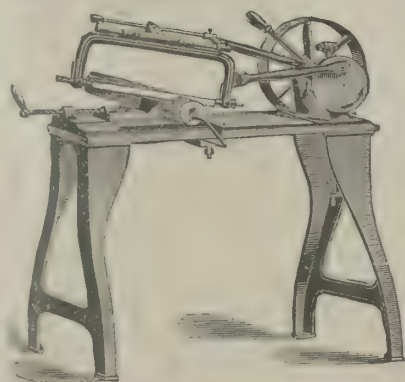
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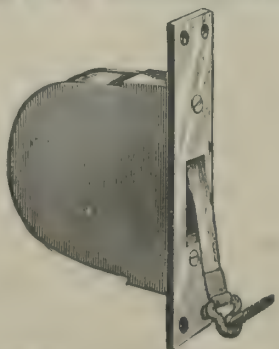
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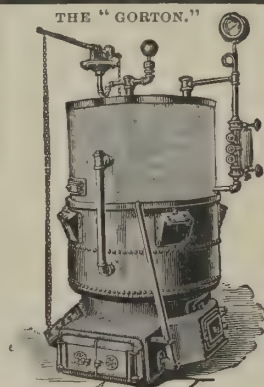
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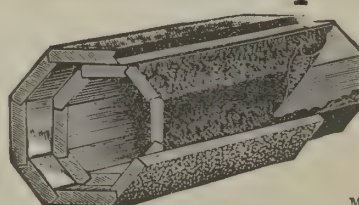
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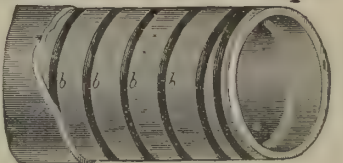


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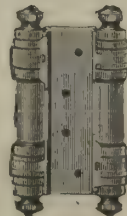
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